THOMAS DILWORTH,
Schoolmaster.

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THE Schoolmaster's Assistant:

BEING A

COMPENDIUM OF ARITHMETIC,

BOTH

PRACTICAL AND THEORETICAL.

IN FIVE PARTS.

CONTAINING,

I. Arithmetic in Whole Numbers, in which all the common Rules, having each a sufficient Number of Questions, with their Answers, are methodically and briefly handled.

II. Vulgar Fractions, wherein several Things, not commonly met with, are there distinctly treated of, and laid down in the most plain and easy Manner.

III. Decimals, in which among other Things, are considered the Extraction of Roots; Interest both Simple and Compound; Annuities, Rebate, and Equation of Payments.

IV. A large Collection of Questions, with their Answers, serving to exercise the foregoing Rules; together with a few others, both pleasant and diverting.

V. Duodecimals, commonly called Cross Multiplication; wherein that Sort of Arithmetic is thoroughly considered, and rendered very plain and easy; together with the Method of proving all the foregoing Operations at once by Division of several Denominations, without reducing them to the lowest Term mentioned.

The Whole being delivered in the most familiar Way of Question and Answer, is recommended by several eminent Mathematicians, Accomptants, and Schoolmasters, as necessary to be used in Schools, by all Teachers who would have their Scholars thoroughly understand, and make a quick Progress in, Arithmetic.

To which is prefixed, AN ESSAY ON THE EDUCATION OF YOUTH: Humbly offered to the Consideration of Parents.

BY THOMAS DILWORTH,
Author of the *New Guide to the English Tongue; Young Book-keeper's Assistant, &c. &c.* and *Schoolmaster* in *Wapping*.

All Things which from the very first Original Being of Things, have been framed and made, do appear to be framed by the Reason of Number; *for* this *was the principal Example or Pattern in the Mind of the* Creator.—Anitius Boetius.

Thou [O LORD] *hast ordered all Things in Measure,* Number, *and Weight.*
Wisdom xi. 20.

PHILADELPHIA:
PRINTED FOR, AND SOLD BY, JOSEPH CRUKSHANK, NO. 87, HIGH-STREET, BETWEEN SECOND AND THIRD STREETS. MDCCXCVI.

JERSEY STATE MUSEUM
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JUN

THE

PREFACE DEDICATORY.

TO THE REVEREND AND WORTHY

SCHOOLMASTERS

IN

GREAT BRITAIN AND IRELAND.

GENTLEMEN,

AFTER returning You my moſt hearty Thanks for Your kind Acceptance of my *New Guide* to the *Engliſh* Tongue, permit me to lay before you the following *Pages*, which are intended as an *Help* towards a more ſpeedy *Improvement* of your Scholars in *Numbers*, and at the ſame Time, to take off that *heavy Burden* of writing out *Rules* and *Queſtions*, which you have ſo long laboured under.

I need not, I preſume, ſay any Thing concerning the Uſefulneſs of, and Advantages that accrue to Mankind in general from, *Arithmetic*, ſince they are, by this Time, pretty well known; and alſo deſerve the Employment of a much better *Pen* than mine can pretend to be; but I will venture to ſay thus much, and I believe you will pardon me for it, that THIS (by putting one in each *Arithmetici-*

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an's Hand) will not only prove a kind ASSISTANT to You, but, upon Trial, be found at once both to delight and improve the Minds of those who are committed to your Care.

I have gone through all the Parts of *Arithmetic*, commonly taught in *Schools*, and have included several others no less useful: And though I have given more *Questions* to work upon in each *Rule* (which was absolutely necessary, none having yet calculated their *Performances* of this *Kind*, for the use of *School-Boys*) I have endeavoured at the same Time to reduce the *Whole*, to as neat and portable a *Volume*, as any that have gone before me.

I must confess, I do not propose by THIS to add to any *Master's* Knowledge in *Arithmetic*, who I imagine, is already acquainted with every Thing contained in this *Compendium*; for which Reason it is reduced to the narrow Compass it now appears in, without particular Directions for working the *Operations* at large; and therefore, I conceive here is Room enough left for every *Man* to speak his own Mind, and instruct his *Pupils* in his own *Method*. And,

I believe, it is confessed by All, that it is a Task too hard for *Children* to be made complete *Masters* of *Arithmetic*; and therefore the best Way of instructing them in it is, most certainly, first to give them a general Notion of it, in the easiest Manner, and next to enlarge upon it afterward, if there be Time; otherwise it must be done by themselves, as their Increase in *Years* and Growth in *Understanding* will permit. * " *For* Arithmetic is the *more* " *valuable, as it is the more* exact, easy, *and* short; *and* " *the* Art *lies in giving as few* Rules *as possible, and clear-* " *ly explaining them; and not confounding* Principles *toge-* " *ther, and then diversifying them into several* Rules, *when* " *they are built on the same* Reason, *which has not only made* " Arithmetic *seem difficult of* Access, *but has hindred ma-* " *ny from being* Accomptants."

To enter into a *Detail* of the following *Particulars*, would be tedious, and swell this *Preface*, beyond its just *Limits*:

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Limits; but that the *Kind Reader* may not be wholly at a Loſs, I ſhall beg leave to ſpeak as follows, *viz.*

1. That the *Whole* is divided into *Five Parts*, as the *Title Page* expreſſes it.

2. That the *Rules* and *Examples* are contrived in the plaineſt *Manner*, and the *Whole* put in ſuch an eaſy *Method*, as is no where elſe extant.

3. I have omitted *Reduction* of *Foreign Coins*, partly becauſe all thoſe *Tables*, which I have met with, which ſhew the Value of *Foreign Coins* in *Engliſh Money*, are very erroneous, but principally becauſe all ſuch *Queſtions* as relate to the turning of the *Money* of one *Country* into that of another, are much better anſwered under the Head of *Exchange*. For the *Value* of *Foreign Species* (ſuch I mean as relate only to *Exchange*) both of *Gold* and *Silver*, in every *Country* is unſettled, and therefore ſuch *Coins* are ſubject to vary in their *Prices*, as the *Merchants* find an Opportunity to profit by them. Hence proceed the *various Courſes* of *Exchange;* and from them again, the particular *Worth* of any *Quantity* of *Foreign Coin* in *Engliſh Money*, which is ſometimes *more*, ſometimes leſs, according as the *Courſe* of *Exchange* runs at the Time when ſuch *Foreign Coin* becomes due. Add to this the *Agio* or *Advance Money*, uſually paid *Abroad* on the changing *Current Money* into *Exchange* or *Bank Money*, which is 2, 3, or more *per Cent.* in Payment, according to what the *Exchange* or *Bank Money* is worth more than the *Current Money*, and this cannot be done otherwiſe than by the *Rule of Three.*

4. In *Intereſt, &c. by Decimals*, I have followed Mr. WARD's Method, by which Means the *Rule* is drawn into a much narrower Compaſs; and appears more beautiful to the Eye than in Words at Length.

5. In all Places where it could be done conveniently, I have given Directions for varying the *Examples* by Way of *Proof;* becauſe it not only diſcovers the *Reaſon* of the *Operation*, but at the ſame Time both produces a new *Queſtion*, and proves the *old One*. And ſure I am, that the varying the *Queſtion*, when it may be done under the ſame *Rule*, contributes very much towards a thorough

Underſtanding of it, and making a *good* Accomptant, as every one's Experience will teach him.

6. I have thrown the Subject of the following Pages into a *Catechetical Form*, that they may be the more inſtructive; for *Children* can better judge of the Force of an *Anſwer*, than follow *Reaſon* thro' a Chain of *Conſequences*. Hence alſo it proves a very good *examining Book*; for at any Time, in what Place ſoever the *Scholar* appears to be defective, he can immediately be put back to that *Place* again, without the formal Way of beginning every Thing anew.

7. In Order to make the *Progreſs* ſtill quicker, every *Example*, to be wrought, has its *Anſwer* annexed to it: So that they who do not chuſe to have every *Operation* proved by varying the *Queſtion*, may know without it, whether the *Work* be right or not.

8. Concerning *Contractions* in Numbers, which ſome are very fond of, I have ſaid very little, and my Reaſon is this; *Contractions* are no farther valuable than they are uſeful; hence, if in order to leſſen the Number of Figures in an operation, there is not only more Time ſpent than in the ordinary Way, but thoſe *Contractions* are alſo more liable to Error, ſuch *Contractions* ought to be rejected.

And now, after all, it is poſſible that ſome, who like beſt to tread the *old beaten Path*, and to *ſweat* at their *Buſineſs* when they may do it with *Pleaſure*, may ſtart an *Objection* againſt the Uſe of this *well intended Aſſiſtant*; becauſe the Courſe of *Arithmetic* is always the ſame; and therefore ſay, '*That ſome Boys, lazily inclined, when they* '*ſee another at work upon the ſame Queſtion, will be apt to* '*make his Operation paſs for their own*:' But *theſe little Forgeries* are ſoon detected by the Diligence of the *Tutor*: Therefore, as *different Queſtions to different Boys*, do not in the leaſt promote their *Improvement*: So neither do the ſame *Queſtions* hinder it. Neither is it in the Power of any *Maſter* (in the Courſe of his *Buſineſs*) how full of Spirits ſoever he be, to frame *new Queſtions* at Pleaſure, in any *Rule*, but the ſame *Queſtions* will frequently occur in the *ſame Rule*, notwithſtanding his greateſt *Care* and *Skill* to the Contrary.

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It may alſo be further objected, '*That to teach by a printed Book, is an Argument of Ignorance and Incapacity*,' which is no leſs trifling than the former. He indeed (if any ſuch there be) who is afraid his *Scholars* will improve too faſt, will undoubtedly decry this *Method*: But that *Maſter's ignorance* can never be brought in Queſtion, who can begin and end it readily; and moſt certainly that *Scholar's Non Improvement* can be as little queſtioned, who makes a much greater *Progreſs* by *This*, than he poſſibly can by the *common Method*.

As to the *Order* of the *Rules*, I can hardly find *two Maſters* follow it alike; ſome liking beſt to teach that *Rule* firſt, which another thinks more convenient to teach afterward; while a third looks upon it as a Matter quite indifferent, among *ſome Rules*, which he teaches firſt. But this need be no *hindrance* to the Uſe of this *Book*. For however the *Rules* are placed here, every Man may turn to that *Rule* firſt, which he likes ſhould be taught firſt; and if a *Maſter* has a mind to teach *Vulgar Fractions* immediately after *Reduction* of *whole numbers*, as ſome do, he may do it as eaſily as in the Order they now lie.

To the eleventh *Edition*, and which is continued in this, I have added, *Duodecimals*, commonly called, *Croſs Multiplication*; wherein I have largely treated of that Sort of Arithmetic, in every Branch; ſhewing how the ſame may be proved by varying the Operations; by whole *Numbers*; by vulgar *Fractions*, and by *Decimals*; and laſtly by a particular Sort of *Diviſion*, wherein the Diviſor, Dividend, and Quotient, are each of them of ſeveral Denominations, juſt as the Factors and Products are in *Multiplication*, without reducing them into the loweſt Term or Denomination mentioned. And as *Duodecimals*, by all the Writers that I have ſeen, except Mr. *Hawney*, have only been ſuperficially treated of, I think I may venture to ſay, without any Breach of Modeſty, that this is the compleateſt Piece of that Kind extant.

As a further Improvement of this Compendium, I have conſiderably enlarged the *Rule* of *Exchange*, and among others, have given a Variety of Examples of real Bills of Exchange, to be wrought by the Pupil in order to ſhew him,

him, in a more particular Manner, the Neceſſity of knowing how to turn the Money of one Country into the Money of another Country, Value for Value, where the Merchant happens to be engaged in foreign Trade. I have alſo taken the Liberty to put the *Double Rule of Three* after *Exchange*, which in moſt of the former Editions ſtood before it, to the End that all the Mercantile Rules in whole Numbers might ſtand together; and likewiſe that the Pupil might, at the End of *Exchange*, enter upon a Courſe of Book-keeping, if there ſhould not be Time for him to go through the whole Compendium firſt.

I ſhould have been very glad to have ſeen an *Attempt* of *this Nature*, ſtampt by the Authority of ſome *Perſon* of *Diſtinction* and of *better Abilities*; but ſince no *abler Hand* has undertaken it, I hope its homely Appearance will not leſſen its *Uſefulneſs*.

The *Printer's Errors* as well as my own *Defects*, I hope will candidly be overlooked: But becauſe a Man's Failings are ſo familiar to himſelf, that he can ſcarce diſcern them; therefore the kind Admonitions of a *good natured Reader*, ſhall always be very acceptable.

I have nothing more to add, but my *repeated Thanks* for *Favours* received, together with my *earneſt Deſire* that you may be proſperous in your *ſeveral Under-kings*, and to beg this *additional Favour* of being eſteemed,

GENTLEMEN,

Your moſt humble, and

moſt obedient Servant,

THOMAS DILWORTH.

AN

ESSAY

ON THE

EDUCATION OF YOUTH.

HUMBLY OFFERED TO THE

CONSIDERATION OF PARENTS.

THE right Education of Children is a Thing of the highest Importance, both to Themselves and the Commonwealth. It is this, which is the natural Means of preserving Religion and Virtue in the World: And the earlier good Instructions are given, the more lasting will be their Impression. For it is as unnatural to deny these to Children, as it would be to with hold from them their necessary Subsistence. And happy are those, who, by a religious Education and watchful Care of their Parents, their wise Precepts and good Examples, have contracted such a Love of Virtue and Hatred of Vice, as to be removed out of the Way of Temptations. And it is owing to the Want of this Education, that many, when they leave their Schools, do not prove so well qualified as might be expected. This great Omission being, for the most Part, chargeable on the Parents, I hope the following Particulars (which are the common Voice of our Profession) will not be taken amiss. And,

1. A constant Attendance at School is one main Axis whereon the great Wheel of Education turns: Therefore, if that Observation, which is commonly made by Parents, be true, That the Masters have Holidays enough of their own

own making, there is, by their own Confession, no Necessity for them to make an Addition.

2. Parents should never let their own Command run counter to the Master's, but whatever Task he imposes on his Pupils, to be done at Home, they should be careful to have it performed in the best Manner, in Order to keep them out of Idleness. * "For vacant Hours move on "heavily, and drag Rust and Filth along with them; and "'tis full Employment, and a close Application to Busi-"ness, that is the only Barrier to keep out the Enemy, "and save the future Man."

3. Parents themselves should endeavour to be sensible of their Children's Defects and Want of Parts; and not blame the Master for Neglect, when his greatest Skill, with some, will produce but a small Share of Improvement. But the great Misfortune is, as the Proverb expresses it; Every bird thinks her own Young the fairest: and the tender Mother, tho' her Son be of an ungovernable Temper, will not scruple to say, He is a meek Child, and will do more with a Word than a Blow, when neither Words nor Blows are available. On the other Hand, some Children are of a very dull and heavy Disposition; and are a long Time in gathering but a little Learning, and yet their Parents think them as capable of Instruction as those who have the most bright and promising Parts: And when it happens that they improve but slowly, tho' it be in Proportion to their own Abilities. they are hurried about from School to School, till at last they lose that Share of Learning, which otherwise, by staying at the same School, they might have been Masters of. Just like a sick but impatient Man, who employs a Physician to cure him of his Malady; and then, because the Distemper requires Time as well as Skill to procure his Health, tells him, 'He has all along taken a wrong Method;' turns him off, and then applies to another, whom he serves in the same Manner; and so proceeds till the Distemper proves incurable.

4. It is highly Necessary that Children should be early made sensible of the Scandal of telling a Lye: To this End

* Watts's Essay.

End Parents muſt inculcate upon them, betimes, that moſt neceſſary Virtue of ſpeaking Truth, as one of the beſt and ſtrongeſt Bands of Human Society and Commerce, and the Foundation of all Moral Honeſty.

5. Injuſtice (I mean the tricking each other in Trifles, which ſo frequently happens among Children, and is very often countenanced by the Parents, and looked on as the Sign of a very promiſing Genius) ought to be diſcouraged betimes, leſt it ſhould betray them into that vile Sin of pilfering and purloining in their riper Years; to which the grand Enemy of Mankind is not wanting to prompt them by his Suggeſtions, whenever he finds their Inclinations have a Tendency that Way.

6. Immoderate Anger and Deſire of Revenge, muſt never be ſuffered to take Root in Children. For (as a moſt Reverend Divine obſerves) * "If any of theſe be che-"riſhed, or even let alone in them, they will, in a ſhort "Time, grow head-ſtrong and unruly: and when they "come to be Men, will corrupt the Judgment, turn good "Nature into Humour, and Underſtanding into Prejudice "and Wilfulneſs."

7. Children are very apt to ſay at Home what they ſee and hear at School, and oftentimes more than is true; and ſome Parents, as often are weak enough to believe it. Hence ariſe thoſe great Uneaſineſſes between the Parents and the Maſter, which ſometimes are carried ſo high, as for the Parent, in the Preſence of the Child, to reproach him with hard Names, and perhaps with more abuſeful Language. On the Contrary,

8. If Parents would have their Children improve in their Learning, they muſt cauſe them to ſubmit to the little (imaginary) Hardſhips of the School, and ſupport them under them by ſuitable Encouragements. They ſhould not fall out with the Maſter upon every idle Tale, nor even give their Children the Liberty of expreſſing themſelves that Way; but they ſhould, by all Means, inform them frequently, 'That they ought to be good Boys, 'and learn their Book, and always do as their Maſter bids 'them, and that if they do not, they muſt undergo the 'Pain

* A. B. TILLOTSON.

'Pain of Correction.' And it is very obſervable what a Harmony there is between the Maſter and the Scholar when the latter is taught to love and have a good Opinion of the former; and then, With what Eaſe does the Scholar learn! With what Pleaſure does the Maſter communicate!

9. The laſt Thing that I ſhall take Notice of is, That while the Maſter endeavours to keep Peace, good Harmony, and Friendſhip among his Scholars, they are generally taught the Reverſe at Home. * "It is indeed but "too common for Children to encourage one another "and be encouraged by their Friends in that ſavage and "brutal Way of Contention, and to count it a hopeful "Sign of Mettle in them to give the laſt Blow, if not "the firſt, whenever they are provoked; forgetting at the "ſame Time, that to teach Children betimes to love and "be good natured to others, is to lay early the true "Foundation of an honeſt Man. Add to this, that cruel "Delight which ſome are ſeen to take in tormenting and "worrying ſuch poor Animals and Inſects as have the "Misfortune to fall into their Hands. But Children "ſhould not only be reſtrained from ſuch barbarous Di-"verſions, but ſhould be bred up from the Beginning to "an Abhorrence of them," and at the ſame Time be taught that great Rule of Humanity, To do to others as we would they ſhould do to us.

From what has been ſaid relating to the Management of Children at Home, the Neceſſity of the Parents joining Hands with the Schoolmaſter, appears very evidently. For when the Maſter commands his Pupils to employ their leiſure Time in getting ſome neceſſary Parts of Learning, their Friends ſhould not command them to forbear: And when they ought to be at School at the ſtated Hours, they ſhould not be ſent an Hour or two after, in the Time of Health, ſometimes with a Lye in their Lips to excuſe their Tardineſs; and ſometimes with an Order, and a brazen Front, to tell their Maſter, Their Friends think it Time enough to come to School at nine in the Morning, becauſe the Weather is a little cold, or becauſe they

* Talbot's Chriſtian Schoolmaſter.

they muſt have their Breakfaſt firſt. I ſay, Parents ſhould not act ſo indiſcreetly, becauſe it clips the Wings of the Maſter's Authority: It makes Boys firſt deſpiſe and undervalue their Teachers, and then become unmannerly and impertinent to them; Correction for which, makes the Tutor hated by the Children, and then there naturally follows either a total Diſregard to Buſineſs, or a general Careleſſneſs in every Thing they do. And,

While I am ſpeaking of the Education of Children, I hope I ſhall be forgiven, if I drop a Word or two relating to the fair Sex.—It is a general Remark that they are ſo unhappy as ſeldom to be found either to Spell, Write, or Cipher well: and the Reaſon is very obvious; becauſe they do not ſtay at their Writing Schools long enough. A Year's Education in Writing is, by many, thought enough for Girls; and by others it is thought Time enough to put them to it, when they are eighteen or twenty Years of Age; whereas, by ſad Experience, both theſe are found to be, the one too ſhort a Time, and the other too late. The firſt is a Time too ſhort, becauſe, when they are taken from the Writing School, they generally forget what they learnt, for want of Practice: And the other too late, becauſe then they are apt to look too forward, imagine all Things will come of themſelves without any Trouble, and think they can learn a great Deal in a little Time; and when they find they cannot compaſs their Ends ſo ſoon as they would, then every little Difficulty diſcourages them: and hence it is that adult Perſons, ſeldom improve in the firſt Principles of Learning ſo faſt as younger Ones. For a Proof of this, I appeal to every Woman, whether I am juſt in my Sentiments or not.—The Woman who has had a liberal Education this Way, knows the Advantages that ariſe from the ready Uſe of the Pen; and the Woman who has learnt little or nothing of it, cannot but lament the Want of it. Girls therefore ought to be put to the Writing School as early as Boys, and continued in it as long, and then it may reaſonably be expected that both Sexes ſhould be alike ready at their Pen. But for want of this, How often do we ſee Women when they are left to ſhift for them-

ſelves in the melancholy State of Widowhood and (what Woman knows that ſhe ſhall not be left in the like State?) obliged to leave their Buſineſs to the Management of others; ſometimes to their great Loſs, and ſometimes to their utter Ruin; when on the Contrary had they been ready at their Pen; could ſpell well, and underſtand Figures, they might not only have ſaved themſelves from Ruin, but perhaps have been Miſtreſſes of good Fortunes. Hence then may be drawn the following, but moſt natural Concluſion, viz. * "The Education of Youth is of "ſuch vaſt Importance, and of ſuch ſingular Uſe in the "Scene of Life, that it viſibly carries its own Recom-"mendation along with it: For on it, in a great Meaſure "depends all that we hope to be; every perfection that "a generous and well-diſpoſed Mind would gladly arrive "at: 'Tis this that ſtamps the diſtinction of Mankind, "and renders one Man preferable to another: Is almoſt "the very Capacity of doing well; and remarkably adorns "every Point of Life." And as the great End of human Learning is to teach a Man to know himſelf, and thereby fit him for the Kingdom of Heaven: So he that knows moſt, conſequently is enabled to practice the beſt, and become an example to thoſe who know but little, or are quite ignorant of their Duty. I am,

Your and your Children's Well-wiſher,

THOMAS DILWORTH.

* WATTS's Eſſay.

To Mr. THOMAS DILWORTH,

AUTHOR OF

The Schoolmaster's Assistant.

SIR,

AS you was pleased to favour me with the Perusal of Your *Schoolmaster's Assistant* in Manuscript, which gave me a sensible Pleasure; You have thereby obliged me, in Justice to your Merit, to give my humble Opinion upon it.—That a Work of *this Kind* has been long wanted, admits of no Dispute; and I must confess, that you have treated the Subject so methodically, laid down the several Rules so very plain, yet concise, as must make this Book of general Use and Advantage: And I heartily wish you may meet with equal Encouragement in the Publication of this, as you did in your excellent *New Guide* to the *English Tongue*. I am, SIR,

London, 29th of November, 1743.

Your sincere Friend,
And humble Servant,
BRIGHT WHILTON.

To Mr. THOMAS DILWORTH,

ON HIS

Schoolmaster's Assistant.

SIR,

I HAVE perused, with Pleasure, Your *Schoolmaster's Assistant*, and give you my Thanks for your kind Endeavours to further the Improvement of Youth with greater Facility to the Tutor.

I am convinced, that Piece is well calculated to promote both, and therefore wish you the Success due to so much useful Labour. I am, SIR,

Twelve-Bell-Court, in Bow-Church-Yard, 13 Jan. 1743.

Your Friend and Servant,
WILLIAM COLES.

To Mr. Thomas Dilworth, *on his Treatise of* ARITHMETIC, *entitled,* The Schoolmaster's Assistant.

IT is universally allowed (in all Nations civilized) that the Instruction of Youth is of the greatest Importance, the Happiness of every Individual, and Society in general thereon depending, and that it is of two Kinds, viz. To form the good Man and the good Scholar. To compleat the latter, those Studies are chiefly to be pursued, which are adequate to the Disposition of the Pupil, and to compleat the Man of Business he is designed for: But I do not know any Business that can be well executed without ARITHMETIC. THIS therefore claims the first Place, and due Care of the Master, to inculcate and explain its Rudiments, which will not only ground the Tyro, but also give him some Glances of those Beauties and Uses, he may expect from his present Labours: Every Help then, that may gain the Master Time in the Discharge of his Duty, will (in Consequence) add to the Improvement of his Scholars: For which Use and Purpose, that this Book is well adapted (having perused it some time ago in Manuscript) is the ingenuous opinion of

SIR,

Gainsford-street, Shad-Thames, Southwark, 9th of May, 1743.

Your respectful Friend and Servant,

William Mountaine.

To Mr. Thomas Dilworth, *Author of the* Schoolmaster's Assistant.

SIR,

I Have perused your Book, intitled, the Schoolmaster's Assistant, and readily recommend it as a proper Companion, for such as are employed in teaching Arithmetic, as well as for those who are desirous of Improvement in that useful and necessary Science. I am, SIR,

The Academy in Little Tower-street, 29th March, 1744.

Your humble Servant,

Em. Austin.

To Mr. THOMAS DILWORTH,

ON HIS

COMPENDIUM OF ARITHMETIC,

ENTITLED

The Schoolmaſter's Aſſiſtant.

WHILE ſome ſeducive of the riſing Age,
Expoſe for Hire the lewd and factious Page,
On every Stall appear the Public Peſt,
Deep Bane inſtilling in the tender Breaſt;
Thou, Friend of moral as of ſocial Truth!
Employ'ſt thy Toils to mend our growing Youth.
Thy Cares, how worthy of the Good and Wiſe,
Impower the Embryo Genius firſt to riſe;
Make the dark Clues of Science plain to find,
And thro' its Mazes lead the pleaſur'd Mind.
E'en now afreſh, unweary'd in thy Pains,
For future Times thy recent Taſk remains:
By double Motives it aſſures to pleaſe,
The Youth's Inſtructor, and the Tutor's Eaſe:
From darker Forms it clears encumber'd Rules,
And Learning makes the fit Delight of Schools.

Thy Labours, Friend, have found their juſt Succeſs,
And gen'ral Plaudits thy Deſert confeſs.
O may THIS WORK, nor THIS be found thy laſt,
No ſordid Pride o'erlook, or Envy blaſt,
Far as our Mother-Tongue extends, be known,
And grateful Pupils thy Aſſiſtance own.

MOSES BROWN.

To Mr. THOMAS DILWORTH,

ON HIS

Schoolmaſter's Aſſiſtant.

DILWORTH, the Man by gracious Heaven deſign'd,
A Friend, a Father, to the Human kind;
Whoſe active Diligence and warmer Zeal
United, centre in the Public Weal.
Fain wou'd my Muſe diſcharge the Debt of Praiſe,
With freſh Additions to thy circling Bays.

LEARNING, the Glory of *Britannia*'s Iſle,
Within thy fav'rite Leaves is taught to ſmile,
No more perplex'd in Error's Maze we run,
And meet the Danger which we ſought to ſhun;
Since, drawn by thee, now ſhines before our Eyes,
The Path where Virtue and fair Knowledge lies:
There waits a * Guide, by niceſt Model plann'd,
Here ſtands an uſher with aſſiſting Hand;
A work ſo clear, delighted we purſue,
And think the pleaſing Proſpect ever new.

So the kind Sun, with all reviving Ray,
Clears the dark World with an approaching Day:
Before his Light the empty Shadows fly,
And Nature glows with a ſerener Sky.

WILLIAM DEANE.

Halifax, *Oct.* 20, 1765.

* Referring to that of the *Engliſh Tongue*.

The Explication of some Marks *used in this* COMPENDIUM.

= TWO Parallel Lines are the Marks of Equality; as, 12oz. = 1lb. signifies that 12 Ounces are equal to 1 Pound.

+ Saint George's Cross signifies more, or Addition; as, 4 + 2 = 6: i. e. 4 more 2, are equal to 6.

— A straight Line signifies less, or Subtraction; as, 4 — 2 = 2: i. e. 4 less 2, are equal to 2.

× Saint Andrew's Cross denotes Multiplication; as, 4 × 2 = 8: i. e. 4 multiplied by 2, are equal to 8.

÷ ⩱ A Line between two Points, or between 4 Points, is the Sign of Division; as, 4 ÷ 2 or 4 ⩱ 2 = 2: i. e. 4 divided by 2, is equal to 2.

)(The reverse Parenthesis denotes Division also; as, 2)4(2: i. e. 4 divided by 2, is equal to 2.

$^{4}\frac{7}{3}\frac{6}{2}{}^{1}$ Numbers placed in a Fraction-like manner, do likewise denote division; the lower Number being the Divisor, and the upper Number the Dividend.

: : Four Points, set in the Middle of four Numbers, denote them to be proportional to one another, by the Rule of Three; as, 2 . . 4 : : 8 . . 16: that is, as 2 is to 4, so is 8 to 16.

N. B. Some Masters, instead of *Points*, use long *Strokes* to keep the *Terms* separate, but it is wrong to do so; for the two *Points* between the *first* and *second Terms*, and also between the *third* and *fourth Terms*, *show* that the two *first*, and the two last *Terms* are in the same Proportion. And whereas *four Points* are put between the *second* and *third Terms*, they serve to disjoint them, and shew that the *second* and *third* and *first* and *fourth Terms* are not in the same direct Proportion to each other as are those before mentioned.

Money

To Mr. THOMAS DILWORTH,

ON HIS

Schoolmaſter's Aſſiſtant.

DILWORTH, the Man by gracious Heaven deſign'd,
A Friend, a Father, to the Human kind;
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LEARNING, the Glory of *Britannia*'s Iſle,
Within thy fav'rite Leaves is taught to ſmile,
No more perplex'd in Error's Maze we run,
And meet the Danger which we ſought to ſhun;
Since, drawn by thee, now ſhines before our Eyes,
The Path where Virtue and fair Knowledge lies:
There waits a * Guide, by niceſt Model plann'd,
Here ſtands an uſher with aſſiſting Hand;
A work ſo clear, delighted we purſue,
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Money

Explication *of some* Marks, *&c.*

Money.

£. Libræ, Pounds.
S. Solidi, Shillings.
D. Denarii, Pence.
Qrs. Quadrantes, Farthings.

$2 + 3 \times 5 = 25$, Signifies that the Sum of 2 and 3 multiplied by 5, is equal to 25.

$3 - 2 \times 5 = 5$, signifies that the Difference between 3 and 2, multiplied by 5, is equal to 5.

$\sqrt{}$ or $\sqrt{}$q Prefixt to any Number, supposes that the Square Root of that Number is required. Sometimes it is the Sign of Irrationality, and signifies that the Square Root of such a Number can never be truly found.

$\sqrt{}$c. Prefixt to any Number, supposes that the Cube Root of that Number is required. Sometimes it is the Sign of Irrationality, and signifies that the Cube Root of such a Number can never be truly found.

$3aa + 3a$, Signifies 3 times the Square of a, more 3 times a.

$3aae + 3eea + eee$, Signifies 3 times the Square of a, multiplied by e; more 3 times the Square of e, multiplied by a; more the Cube of e, as in the Cube Root.

BRITISH MUSEUM
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THE

THE

Schoolmaster's Assistant.

PART I.

Of Arithmetic in Whole Numbers.

THE INTRODUCTION.

Of Arithmetic in general.

Q. WHAT *is* Arithmetic?

A. Arithmetic is the Art or Science of computing by Numbers, either whole or in Fractions.

Q. *What is* Number?

A. Number is one or more Quantities, answering to the Question, *How many?*

Q. *What is Arithmetic in* Whole Numbers?

A. Arithmetic in *whole Numbers* or *Integers*, supposes its Numbers to be entire Quantities, and not divided into Parts.

Q. *What is Arithmetic in* Fractions?

A. Arithmetic in *Fractions*, supposes its Numbers to be the Parts of some entire Quantity.

Q. *How do you consider Arithmetic with Regard to* Art *and* Science?

A. Both in *Theory* and *Practice*.

Q. *What is* Theoretical Arithmetic.

A. Theoretical Arithmetic considers the Nature and Quality of Numbers, and demonstrates the Reason of practical Operations. And in this Sense Arithmetic is a *Science*.

Q. *What is* Practical Arithmetic?

A. Practical Arithmetic is that which shews the Method of working by Numbers, so as may be most useful and expeditious for Business. And in this Sense Arithmetic is an *Art*.

Q. *What is the Nature of all* Arithmetical Operations?

A. The Nature of all *Arithmetical Operations* is, by some Quantities that are given, to find out others that are required.

Q. *Which are the fundamental Rules in* Arithmetic?

A. These Five; *Notation*, *Addition*, *Subtraction*, *Multiplication*, and *Division*.

Of

Of NOTATION.

Q. WHAT *is* Notation?

A. It is the *Art* of expressing *Numbers* by certain *Characters* or *Figures*.

Q. *What is the* Use *of* Notation?

A. Notation teaches to read and write Numbers by their true Value.

Q. *How many Sorts of* Characters *or* Figures *are Numbers usually expressed by?*

A. Two, *viz.* The *Arabic Figures* and the *Latin Letters.*

Q. *How are the* Arabic Figures *expressed?*

A. The *Arabic Figures* are thus expressed; *One* 1, *Two* 2, *Three* 3, *Four* 4, *Five* 5, *Six* 6, *Seven* 7, *Eight* 8, *Nine* 9 *Nought* or *Cipher* 0. And this is the *Notation* or reading and writing of every single Figure.

Q. *How far may the Use of these* Figures *be extended.*

A. These ten *Characters* or *Figures* may be used to express all manner of Numbers, from the least to the greatest, that can be conceived; even without End.

Q. *How many* Figures *are sufficient to express most ordinary Concerns?*

A. Nine; and therefore the Table of *Notation* commonly extends no farther than to *nine* places.

Q. *Why does it consist of* nine *Places, rather than of* eight *or* ten?

A. Because they make up three *even* Periods.

Q. *What do you mean by a* Period?

A. A *Period* is a quantity expressed by three Figures, whereof the first to the right Hand signifies so many *Units* or single Things; the second so many *Tens*; and the third so many *Hundreds.*

Q. *Why are three Figures called a* Period?

A. Because if the Number be increased above *three* Places, there is still the same periodical Return of the Value of those Places, and every *third* Figure to the left Hand, will always be *Hundreds*, if it be never so far extended.

Q. *Is an* Unit *or* one, a *Number?*

A. An *Unit* is a Number, because it may properly answer the Question, *How many?*

Q. *Give an Example or two?*

A. How many *Gods* do we believe? The Answer is, *One.* How many *Sundays* in the Compass of a Week? Answer, *One.*

Q. *In what Nature or Proportion of Value do* Numbers *increase from the* Units *Place to the* [illegible]

A. By *Tens.*

Q. *How*

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Q. *How must they be read?*

A. From the left to the right Hand.

Q. *If* two Figures *are given to be read together, how must they be valued?*

A. The first Figure towards the right Hand is *Units*, and the next to that so many *Tens*; as 89, *Eighty-nine.* Where 9 is in the Place of *Units*, and 8 is in the place of *Tens*; for 8 *Tens* are properly called *Eighty.*

Q. *If* three Figures *or a* whole Period *be given, how is it to be valued?*

A. Beginning at the last Figure on the right Hand, I value them *Units, Tens, Hundreds*; as, 789, *Seven Hundred Eighty and Nine.*

Note 1. As every *third Figure* from the Place of *Units*, bears the Name of *Hundreds*; So for any great Sum to be distinguished into *Periods* (as in the following *Tables*) will be of good Use to the Learner, in the easier valuing and expressing that Sum.

2. There is also another Sort of *Periods*, which some distinguish thus, viz. *Millions, Millions of Millions, &c.* and others thus, viz. *Millions, Billions, Trillions*, &c. each Period consisting of 6 Places, but as *Periods* of this Kind seldom or never occur in *Business*, it is sufficient only to mention them in this Place, without saying any further about them.

TABLE I.

Third Period.			Second Period.			First Period.		
		Millions			Thousands			Units
		X Millions			X Thousands			Tens
		C Millions			C Thousands			Hundreds
								9
							8	9
						7	8	9
					9	7	8	9
				8	9	7	8	9
			7	8	9	7	8	9
		9	7	8	9	7	8	9
	8	9	7	8	9	7	8	9
7	8	9	7	8	9	7	8	9

TABLE. II.

Third Period.			Second Period.			First Period.		
		Millions			Thousands			Units
		X Millions			X Thousands			Tens
		C Millions			C Thousands			Hundreds
								4
							7	3
						9	6	5
					3	4	7	2
				4	8	9	1	3
			7	3	1	2	3	6
		3	1	2	7	1	4	8
	4	3	1	9	2	7	6	4
5	7	3	1	2	9	8	4	2

Note. See the Notation of Numbers by *Latin Letters*, in the *New Guide to the* English *Tongue*, p. 88.

EXAMPLES *for Practice.*

Write down in proper Figures the following Numbers, viz.

Twenty-nine.

Three hundred and forty-eight.

Seven thousand, two hundred and twenty-six.

One thousand, three hundred and ninety.

Nineteen thousand, seven hundred and twenty-eight.

Four hundred and twenty seven thousand, three hundred and ninety-six.

Nine hundred and forty two thousand, seven hundred.

Four millions, seven hundred and eighty-nine thousand, three hundred and twenty-eight.

Seven millions, nine hundred and forty-two thousand, four hundred and seventy-five.

Twenty-six millions, three hundred and fourteen thousand, one hundred and ninety-five.

One hundred and ninety-seven millions, four hundred and thirty-six thousand, one hundred and ninety-one.

Seven hundred and fourteen millions, one hundred and nineteen thousand, seven hnndred and four.

Write down in Words at length the following Numbers, viz.

7 —— 19 —— 846 —— 7428 —— 61261 —— 370121 —— 7126172 —— 74680218 —— 461272615.

Of ADDITION.

Q. WHAT *is the Use of* Addition?

A. Addition teacheth to bring several particular Numbers into one total Sum.

Q. *How many Sorts of* Addition *are there?*

A. Two, *viz. Simple* and *Compound.*

Of Simple ADDITION.

Q. *What is* Simple Addition?

A. Simple or *Single Addition* is the adding of several Numbers together, whose Signification is the same; as 6 Yards and 8 Yards make 14 Yards.

Q. *If several Numbers are given to be added into one Sum, how are they to be placed?*

A. They must be placed in such Manner, that *Units* may stand under *Units; Tens* under *Tens,* &c. *Pounds* under *Pounds; Shillings* under *Shillings,* &c.

Q. *How do you prove* Addition?

A. The best way of proving *Addition* is to begin at the Top of the Sum, and reckon the Figures downward in the same Manner

Manner that they were added upward; and if the second Line or Sum Total be equal to the first, it is right.

EXAMPLES *for Practice.*

£.	*Yds.*	*Gals.*	*Tons.*	*Hhds.*	*lb.*
4	43	764	3746	47476	461743
7	17	147	7416	73712	761710
3	19	384	3406	31819	476312
2	14	736	7198	41243	126712
4	37	197	3173	71208	310748
7	46	473	4731	70956	471381
6	23	382	1262	81461	704714
4	59	769	4731	31269	312624
7	94	367	7169	74196	781462

Miles.	*Leagues.*	*Years.*
4734736	46431734	347312484
3474312	71261374	168126312
4161322	12612714	718126191
7369138	31371261	731618191
3142618	74147312	312124716
4731216	47312614	171216198
4713147	74167571	312614712
3712612	31216126	171614712
7126981	31187412	312814795

Of Compound ADDITION.

Q. *What is* Compound Addition?

A. Compound Addition is the adding of several Numbers together, having divers Denominations.

1. *Of* MONEY.

Q. *Which are the Denominations of* English Money.

A. 4 Farthings make 1 Penny.
12 Pence —— 1 Shilling.
20 Shillings —— 1 Pound *Sterling.*

Q. *Are*

Q. *Are there no other Names of* Money, *used in* England?

A. Yes; such as,

		£.	s.	d.
A Moidore	=	1	7	0
A Guinea	=	1	1	0
A Half Guinea	=	0	10	6
A Crown	=	0	5	0
A Half Crown	=	0	2	6

*** There are also several smaller Pieces which speak their own Value; as, a *Six-pence*, *Four-pence*, *Three-pence*, *Two-pence*, *Penny*, *Half-penny*, and *Farthing*.

Note. The following Pieces were formerly current, but now not so, being only imaginary.

		£.	s.	d.
A Carolus	=	1	3	0
A Jacobus	=	1	5	0
A Mark	=	0	13	4
An Angel	=	0	10	0
A Noble	=	0	6	8

The Pound Sterling is also an imaginary Sum.

Q. *Are there not some* Tables *that may be learned by Heart?*

A. Yes; these following, called *Pence Tables.*

d.		s.	d.	s.		d.
20	=	1	8	2	=	24
30	=	2	6	3	=	36
40	=	3	4	4	=	48
50	=	4	2	5	=	60
60	=	5	0	6	=	72
70	=	5	10	7	=	84
80	=	6	8	8	=	96
90	=	7	6	9	=	108
100	=	8	4	10	=	120
110	=	9	2	11	=	132
120	=	10	0	12	=	144

Note 1. Though I say these *Tables* may be learnt by Heart, I do not sa they *must*; for then, by the same Rule, it would be necessary to ha *Tables* to every *Rule* in *Addition*, which nobody uses, and not every o the *Pence-Tables*; because when they are learned never so perfectl their *Use* extends no farther than *Money*; and, therefore, they may ve well be omitted, and a better *Method* substituted in their Room; mean that of *Pointing*, which I am sure, is both *easier* and *safer* to Begi ners especially. However, I chose to set them down in their Place, th they who approve of them, may use them; and they who do not, c easily omit them.

2. As all the parts of *Addition* are built upon the same *Reason*; so the *M thod of Pointing* may serve as a general *Rule*, when any *Denomination* is be added; and this may be done without defacing the Figures.

EXAMPLES.

£.	s.	d.
4	3	6
1	7	8¼
2	7	4
1	9	4½
3	1	3¾
1	2	1
4	7	6½
3	1	9

£.	s.	d.
1	4	3
3	8	1¼
1	2	6
3	4	7½
1	2	6
3	2	8
7	1	6
4	1	7¼

£.	s.	d.
4	1	6½
1	2	7
3	1	4¼
3	3	6
1	4	1½
3	1	2
1	5	8½
3	1	2

£.	s.	d.
14	12	1
17	11	2
19	12	1½
16	13	1¾
12	13	6
14	12	7¼
19	13	4
12	11	6

£.	s.	d.
19	13	4
12	11	6
17	14	1½
19	13	4½
12	11	6
19	13	1¾
16	12	1
19	11	4¼

£.	s.	d.
47	12	11
17	10	11
17	10	4½
31	12	6
11	19	4
12	12	6¾
11	12	1
11	11	2¼

£.	s.	d.
21	12	10½
31	11	11½
47	11	10¼
19	11	4
31	12	6½
12	11	4¾
37	11	4
19	11	3

£.	s.	d.
12	13	10
71	16	8
19	4	6¾
12	3	1
26	1	6
31	11	1
14	12	6¾
18	18	7

£.	s.	d.
44	12	6¼
31	18	1½
47	12	4
14	12	10¾
16	14	11
19	12	2
16	11	3
17	11	1¼

£.	s.	d.
21	11	11½
16	12	6
11	9	10½
16	12	4¼
34	1	10
17	14	11¼
71	3	1¾
16	1	4

£.	s.	d.
47	11	6½
16	19	11¾
17	12	10¼
19	12	10
17	12	11¾
17	19	4½
47	13	6
72	18	6

£.	s.	d.
47	11	3¾
31	17	3
17	13	11¾
18	14	10½
16	15	11
17	14	3¼
11	18	6
17	17	3

FEDERAL MONEY.

The Denominations are,
10 Mills, *m.* make 1 Cent, *c.*
10 Cents - - 1 Dime, *d.*
10 Dimes - - 1 Dollar, *D.*
10 Dollars - - 1 Eagle, *E.*

A TABLE of COINS which pass current in the United States of North America, with their Sterling and Federal value.

Names of Coins.	*Standard Weight.*		*Sterling Money of Great Britain.*			*New Hampshire Massachusetts, Rhode Island, Connecticut, and Virginia.*			*New York and North Carolina.*			*New Jersey, Pennsylvania Delaware, and Maryland.*			*South Carolina and Georgia.*			*Federal value.*				
																		Eagles.	*Dollars.*	*Dimes.*	*Cents.*	*Mills.*
(GOLD.)	*dwt.*	*gr.*	£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*	*E.*	*D.*	*d.*	*c.*	*m.*
A Johannes, - -	18	0	3	12	0	4	16	0	6	8	0	6	0	0	4	0	0	1	6,	0	0	0
An Half Johannes,	9	0	1	16	0	2	8	0	3	4	0	3	0	0	2	0	0		8,	0	0	0
A Doubloon, -	16	21	3	6	0	4	8	0	5	16	0	5	12	6	3	10	0	1	4,	9	3	3
A Moidore, - -	6	18	1	7	0	1	16	0	2	8	0	2	5	0	1	8	0		6,	0	0	0
An English Guinea,	5	6	1	1	0	1	8	0	1	17	0	1	15	0	1	1	9		4,	6	6	7
A French Guinea, -	5	5	1	1	0	1	7	6	1	16	0	1	14	6	1	1	5		4,	6	0	0
A Spanish Pistole,	4	6	0	16	6	1	2	0	1	9	0	1	8	0	0	18	0		3,	7	7	3
A French Pistole, -	4	4	0	16	0	1	2	0	1	8	0	1	7	6	0	17	6		3,	6	6	7
(SILVER.)																						
An English or French Crown, - - -	19	0	0	5	0	0	6	8	0	8	9	0	8	4	0	5	0		1,	1	1	0
The Dollar of Spain, Sweden or Denmark,	17	6	0	4	6	0	6	0	0	8	0	0	7	6	0	4	8		1,	0	0	0
An English Shilling,	3	18	0	1	0	0	1	4	0	1	9	0	1	8	0	1	0		0,	2	2	2
A Pistareen, -	3	11	0	0	10¾	0	1	2	0	1	7	0	1	6	0	0	11		0,	2	0	0

All other gold coins, of equal fineness, at 89 cents per *dwt.* and silver at 111 cents, per *oz.*

A Grocer's Bill.

Bought of *Thomas Hartley*, May 19, 1796.

		s.	d.		£.	s.	d.
8 lb. of Raisins of the Sun	at	0	5	per lb	0	3	4
5 lb. of Malaga Raisins -	at	0	4½	do.	0	5	7½
10 lb. of Currants - -	at	0	6½	do.	0	5	5
11 lb. of Sugar - -	at	0	4½	do.	0	4	1½
2 Sugar Loaves, wt. 15 lb.	at	0	9	do.	0	11	8
13 lb. of Rice - -	at	0	3	do.	0	3	3
5 lb. of black Pepper -	at	1	6	do.	0	7	6
10 oz. of Cloves - -	at	0	10	per oz.	0	8	4
				Sum			

A Cheesemonger's Bill.

Bought of *Daniel Bridge*, July 17, 1796.

		s.	d.		£.	s.	d.
3 Gloucestershire Cheeses wt. 24 lb.	at	0	4	per lb.	0	8	0
3 Warwickshire Cheeses wt. 20 lb.	at	0	3	do.	0	5	0
1 Cheshire Cheese wt. 28 lb.	at	0	4	do.	0	9	4
½ Firkin of Butter wt. 28 lb.	at	0	6	do.	0	14	0
1 Flitch of Bacon wt. 6 Sto.	at	4	0	per Sto.	1	4	0
7 lb. of Cambridge Butter -	at	0	6	per lb.	0	3	6
9 lb. of new Cheese - -	at	0	4	do.	0	3	0
7 lb. of Cream Cheese -	at	0	6	do.	0	3	6
				Sum			

A Milliner's Bill.

Bought of *Jane Innman*, August 28, 1796.

		s.	d.		£.	s.	d.
15 Yards of Silver Ribbon -	at	2	3	per Yd.	1	13	9
3 Pair of fine Kid Gloves -	at	2	0	per Pair.	0	6	0
6 Dozen of Irish Lamb ditto.	at	1	0	do.	3	12	0
6 Sarsenet Hoods - -	at	4	6	each	1	7	0
15 Fans, India Mounts -	at	4	0	do.	3	0	0
3 Setts of Knotts - -	at	2	0	per Set.	0	6	0
16 Yards of fine Lace -	at	10	0	per Yd.	8	0	0
20 Pieces of Bobbin -	at	0	6	p. Piece	0	10	0
				Sum			

A Car-

A Carpenter's Bill.

Mr. *John Law*, Dr. to *John Brooks*, for Carpenter's Work and Materials, *viz.*

1796.			s.	d.		£.	s.	d.
May 3	For	30 Feet of Fir Timber, at	0	3	per Foot	0	7	6
5	—	18 whole Deals at	1	6	each	1	7	0
	—	16 slit Deals - at	1	0	do.	0	16	0
	—	4 Hundred of six-penny Nails -				0	2	0
	—	3 Hundred of ten-penny Nails -				0	2	6
	—	6 Hundred of Brads - - -				0	1	6
21	—	18 Days Work at	3	0	per Day	2	14	0
					Sum			

A Baker's Bill.

Mr. *Thomas Marriot*, Dr. to *James Barnet*, *viz.*

1796.			£.	s.	d.
Feb. 4	For	a Peck of Bran - - -	0	0	3
	—	a fine Peck Loaf - - -	0	1	8
13	—	a Peck of fine Flour - - -	0	1	8
17	—	a Bushel of Pollard - - -	0	1	0
18	—	small Bread - - - -	0	0	2½
	—	Yest - - -	0	0	1
	—	a half Peck second Loaf -	0	0	9
20	—	a quartern second Loaf - -	0	0	4½
		Sum			

A Bill of Disbursements.

1796.			£.	s.	d.
Feb 17	Laid out in Lamb, seven Groats -				
18	— in Sallad, five Farthings - -				
21	— in Beef, nineteen Pence, Halfpenny				
Mar. 7	— in Parsnips, three Halfpence -				
8	— in Potatoes, a Groat - -				
9	— in Candles, seven Groats and three Pence				
10	— in Butter and Cheese, eight and twenty Pence				
12	— in Bread, three and twenty Pence				
		Sum			

Suppose

A TABLE of other Foreign Coins, &c. with their Value in Federal Money.

	E.	D.	d.	c.	m.
Pound Sterling, -	0	4,	4	4	0
Pound of Ireland, -	0	4,	1	0	0
Pagoda of India, -	0	1,	9	4	0
Tale of China, - -	0	1,	4	8	0
Mill-ree of Portugal,	0	1,	2	4	0
Ruble of Russia, -	0	0,	6	6	0

	E.	D.	d.	c.	m.
Rupee of Bengal, -	0	0,	5	5	5
The Guilder of the United Netherlands, -	0	0,	3	9	0
Mark Banco of Hamburg,	0	0,	3	3	5
Livre Tournois of France,	0	0,	1	8	5
Real Plate of Spain,	0	0,	1	0	0

Standard Weight of Federal Coins.

	dwt.	*gr.*	
A Dime, - -	1	$16\frac{9}{10}$	*Silver.*
A Dollar, -	17	$1\frac{3}{4}$	
An Half Eagle,	5	$14\frac{1}{3}$	*Gold.*
An Eagle, -	11	$4\frac{2}{3}$	

Note. The Federal Standard, for Gold and Silver, is 11 Parts fine and 1 Part alloy.

EXAMPLES.

E.	*D.*	*d.*	*c.*	*m.*
8	3,	7	6	4
5	2,	1	5	3
7	9,	6	3	8
1	4,	3	2	7
5	3,	8	6	1
3	7,	0	2	4
9	2,	5	3	1
6	4,	1	6	3
4	6,	2	1	8
52	3,	6	7	9

Dol.	*Cents.*
213,	57
540,	34
914,	71
241,	16
75,	25
314,	06
27,	33
520,	74
51,	36

E.	*D.*	*d.*	*c.*	*m.*
63	4,	2	2	0
26	5,	7	0	2
18	2,	3	7	3
24	5,	5	1	
9	3,	2	7	
	4,	3	7	5
62	7,	5	2	8
29	3,	2	1	
5	7,	4	9	5

Note. In writing down any Number of Cents less than 10, a cipher must be prefixed in the Place of Dimes. The Figure next to the separating Point on the left Hand, is Dollars, and all to the Left of that, Eagles; but Eagles and Dollars may be read together as Dollars; Dimes and Cents, as Cents; likewise Cents and Mills, or Dimes, Cents, and Mills, enumerated Mills: thus; 523, 679 may be 523 Dollars, 67 Cents, and 9 Mills, or 523 Dollars, 679 Mills, &c.

A Mercer's Bill.

Bought of *George Bailey*, May 17, 1796.

		s.	d.		£.	s.	d.
9 Yards of Silk - -	at	14	6	per Yd.	6	10	6
12 Yards of flowered Silk -	at	16	8	do.	10	0	0
16 Yards of Sarsenet -	at	6	9	do.	5	8	0
10 Yards of Sattin - -	at	9	6	do.	4	15	0
15 Yards of Brocade -	at	10	8	do.	8	0	0
11 Scarves - -	at	2	0	each	1	2	0
14 Yards of Genoa Velvet -	at	17	4	per Yd.	12	2	8
10 Yards of Lustring -	at	5	2	do	2	11	8
				Sum			

A Woollen-Draper's Bill.

Bought of *Thomas Simmons*, June 19, 1796.

		s.	d.		£.	s.	d.
16 Yards of Drugget -	at	7	0	per Yd.	5	12	0
12 Yards of Broad Cloth -	at	15	0	do	9	0	0
9 Yards of black Cloth -	at	16	5	do	7	7	9
10 Yards of Shalloon -	at	1	8	do.	0	16	8
15 Yards of Serge .	at	1	10	do.	1	7	6
7 Yards of fine Spanish Black	at	18	0	do.	6	6	0
16 Yards of Frize - -	at	4	6	do.	3	12	0
12 Yards of superfine Scarlet	at	18	0	do.	10	16	0
				Sum			

A Linen-Draper's Bill.

Bought of *John Clay*, July 17, 1796.

		s.	d.		£.	s.	d.
26 Ells of Dowlas -	at	1	4	per Ell	1	14	8
18 Ells of Holland -	at	4	0	do.	3	12	0
12 Ells of Diaper -	at	1	0	do.	0	12	0
12 Damask Napkins -	at	2	0	each	1	4	0
20 Yards of printed Linen -	at	2	0	per Yd.	2	0	0
10 Yards of Cambric -	at	12	0	do.	6	0	0
10 Yards of Muslin, -	at	7	0	do.	3	10	0
14 Yards of Canvas, .	at	3	4	do.	2	6	8
				Sum			

A Grocer's

Suppose I am indebted £. s. d.

To A, twenty Pounds, seven Shillings and four Pence Farthing
— B, nineteen Pounds, thirteen Shillings and ten Pence Halfpenny
— C, twelve Pounds, fourteen Shillings and seven Pence three Farthings
— D, twenty-six Pounds, seventeen Shillings and four pence Farthing
— E, twenty-eight Pounds, thirteen Shillings and seven Pence three Farthings
— F, twenty-one Pounds, fifteen Shillings and five Pence Halfpenny
— G, five Pounds, six Shillings and seven Pence Farthing

How much is the Debt? Sum

2. *Of* TROY-WEIGHT.

Q. *Which are the Denominations of* Troy-Weight?
A. 24 Grains, or *gr.* make 1 Pennyweight, *dwt.*
20 Pennyweights 1 Ounce, *oz.*
12 Ounces - 1 Pound, *lb.*

Q. *What sort of Things are weighed by this Weight?*
A. Gold, Silver, Jewels, Electuaries, and all Liquors.
Q. *What is the Standard for* Gold?
A. 22 *Carrats* of fine Gold, and 2 *Carrats* of Copper being melted together, are esteemed the true Standard for *Gold* Coin.
Q. *What is a* Carrat?
A. A *Carrat* is not any certain Quantity or Weight, but the twenty-fourth Part of any Quantity or Weight.
Q. *What is the Standard for* Silver?
A. 11 *oz.* 2 *dwts.* of fine Silver, and 18 *dwts.* of Copper being melted together, are esteemed the true Standard for *Silver* Coin; called *Silver Sterling.*

Note. The Ounce of Silver being valued at 5 *Shillings*, one Pennyweight will be valued at three Pence, and the Grain at half a Farthing.

EXAM-

EXAMPLES.

Oz.	*dw.*	*gr.*	*Oz.*	*dw.*	*gr.*	*lb.*	*oz.*	*dw.*	*gr.*	*lb.*	*oz.*	*dw.*	*gr.*
7	10	12	7	13	12	4	10	12	11	7	10	12	10
6	11	11	6	11	14	3	11	16	12	3	16	16	13
5	16	11	9	12	17	1	4	16	19	3	7	12	11
4	17	10	4	16	13	3	3	11	17	1	1	18	16
1	12	16	7	11	14	4	1	16	14	3	11	16	12
7	12	18	6	19	12	3	3	16	11	4	3	16	21
9	16	19	7	13	16	7	11	16	10	3	3	13	11
8	14	16	3	19	14	6	4	13	15	3	7	18	19
4	16	10	5	9	8	5	11	14	13	9	8	19	9
9	4	8	6	2	13	9	10	15	14	7	11	12	8

3. *Of* AVOIRDUPOIS-WEIGHT.

Q. *Which are the Denominations of* Avoirdupois-Weight?

A. 16 Drams or *dr.* make 1 Ounce, *oz.*
16 Ounces - 1 Pound, *lb.*
28 Pounds - 1 Quarter of an Hundred Weight, *qr.*
4 Quarters - 1 Hundred Weight, or 112 Pounds, *C.*
20 Hundred Wt. 1 Ton, *T.*

Q. *What is the Use of* Avoirdupois-Weight?

A. Avoirdupois-Weight is used in weighing any Thing of a coarse and drossy Nature, as all Grocery and Chandlers' Wares, and all Metals but *Silver* and *Gold.*

Note. Bread was formerly weighed by *Troy-Weight*, but is now at *London*, weighed by this Weight.

Q. *What is the Difference between a Pound* Avoirpois *and a Pound* Troy?

A. The Pound *Avoirdupois* is equal to 14 *oz.* 11 *dwt.* 15 *gr.* and an half *Troy;* and the Pound *Troy* is equal to 13 *oz.* 2 *dr.* and an half, and $\frac{9322}{13999}$ *Avoirdupois.*

Q. *What other Denominations are there in this Weight?*

A. There are several other Denominations in *Avoirdupois-Weight*, in some particular Goods, and others only customary in some particular Places; as appears by the following Table.

TABLE

TABLE.

	lb.
A Firkin of Butter is	56
do. of Soap is	64
A Barrel of Pot-Ash is	200
do. Anchovies is	30
do. Candles is -	120
do. Figs, from - to 2 *C.* 3 *qrs.*	98
do. Soap is .	256
do. Butter is -	224
do. Gunpowder is	112
do. Raisins is -	112
A double Barrel of Anchovies is	60
A Puncheon of Prunes is 10 *C.* or 12 *C.*	
A Fother of Lead is 19 *C.* 2 *qrs.*	
A Stone of Iron or Shot is	14
do. Butcher's Meat is	8
A Gallon of Train Oil is	$7\frac{1}{2}$
A Faggot of Steel is	120

	lb.
A Burden of Gad Steel, or 9 Score	180
A Quintal of Fish in *Newfoundland* is	100
A Stone of Glass is -	5
A Seam of Glass is 24 Stone, or	120
For Cheese and Butter.	
A Clove or half Stone is	8
A Wey in *Suffolk* is 32 Cloves, or	256
do. *Essex* is 42 Cloves or	336
For Wool.	
A Clove is - -	7
A Stone is - -	14
A Tod is - -	28
A Wey is 6 Tod and 1 Stone, or	182
A Sack is 2 Weys, or	364
A Last is 12 Sacks, or	4368

EXAMPLES.

T.	*C.*	*qr.*	*lb.*	*C.*	*qr.*	*lb.*	*lb.*	*oz.*	*dr.*	*lb.*	*oz.*	*dr.*
7	11	1	16	17	1	12	14	10	12	12	11	10
1	12	3	11	16	2	11	16	12	11	17	12	10
3	4	1	17	14	1	12	19	12	12	14	12	13
3	1	2	12	16	3	19	17	12	13	16	12	11
7	11	1	11	19	1	12	14	11	10	19	12	11
6	3	2	13	16	3	18	16	15	14	17	13	4
3	1	2	20	12	1	18	13	11	14	16	11	3
4	1	3	26	16	3	19	17	12	10	21	10	7

4. *Of* APOTHECARIES-WEIGHT.

Q. *Which are the Denominations of* Apothecaries-Weight?

A. 20 Grains, or *gr.* make 1 Scruple.
3 Scruples - 1 Dram, *dr.*
8 Drams - 1 Ounce, *oz.*
12 Ounces - 1 Pound, *lb.*

Q. *What is the Use of* Apothecaries-Weight?

A. *Apothecaries-Weight* is such as their *Medicines* are compounded by.

Note 1. The *Apothecaries* mix their *Medicine* by this Rule, yet buy and sell their Commodities by *Avoirdupois-Weight.*

2. The *Apothecaries' Pound and Ounce*, and the *Pound and Ounce Troy*, are the same, only differently divided and subdivided.

EXAMPLES.

lb.	oz.	dr.	sc.	gr.	lb.	oz.	dr.	sc.	gr.	lb.	oz.	dr.	sc.	gr.
3	11	7	2	19	7	1	3	1	10	7	3	1	2	11
1	3	4	1	13	0	1	2	1	14	6	2	7	1	14
0	1	7	2	12	7	3	4	1	12	3	7	2	1	11
1	2	6	2	11	6	1	1	2	11	1	3	1	0	10
2	1	3	1	12	0	0	3	2	17	2	1	2	1	12
1	2	4	0	11	0	1	0	0	10	1	3	1	2	11
7	10	3	1	16	0	1	2	0	10	4	3	1	2	11
1	7	6	1	15	0	3	7	2	19	7	3	2	1	13

5. *Of* LONG-MEASURE.

Q. *Which are the Denominations of* Long-Measure?

A. 3 Barley Corns, or *B. c.* make	1 Inch,	*In.*
4 Inches - -	1 Hand,	*hd.*
12 Inches - - -	1 Foot,	*Ft.*
3 Feet - - -	1 Yard,	*Yd.*
6 Feet - -	1 Fathom,	*Fa.*
5 Yards and a Half -	1 Rod, Pole, or Perch,	*Po.*
40 Poles - - -	1 Furlong,	*Fu.*
8 Furlongs - -	1 Mile,	*M.*
3 Miles - . -	1 League,	*L.*
60 Miles - -	1 Degree,	*Deg.*

Note, A *Degree* is 69 *Miles* and 4 *Furlongs*, very near, though commonly reckoned but 60 *Miles*.

Q. *What is the Use of* Long-Measure?

A. To measure Distances of Places, or any Thing else where *Length* is considered, without Regard to the Breadth.

Q. *Is the* Pole or Perch *always of the same Length?*

A. No.

Q. *What is the Difference?*

A. Five Yards and an Half are the Statute Measure for a *Pole* or *Perch*; but for Fens and Woodlands, it is customary to reckon 18 Feet to the Pole; and for Forests 21 Feet.

Q. *What*

Q. *What is the Use of an* Hand?
A. It is used to measure Horses.
Q. *What is the Use of a* Fathom?
A. It is used to measure Depths.

EXAMPLES.

M.	*f.*	*p.*	*Yds.*	*f.*	*m.*	*L.*	*m.*	*f.*	*p.*	*Yds.*	*f.*	*in.*	*b.c.*
17	7	19	14	2	7	17	2	6	14	16	1	0	0
16	1	14	16	0	4	12	1	1	18	14	2	10	1
19	3	16	19	1	10	16	2	1	16	17	1	4	2
17	4	19	16	2	4	19	2	7	11	13	2	11	1
12	1	11	14	2	5	19	0	4	31	16	1	7	2
18	3	16	14	2	1	17	2	1	12	17	1	4	1
19	7	14	31	1	3	12	1	2	17	19	2	6	2
16	6	26	11	0	1	17	1	1	14	19	2	1	2

6. *Of* CLOTH-MEASURE.

Q. *Which are the Denominations of* Cloth-Measure?
A. 2 Inches, or *in.* and a Quarter, make 1 Nail. *N.*
4 Nails - - - - 1 Qr. of a Yard, *qr.*
4 Quarters - - - 1 Yard, *yd.*
3 Quarters of a Yard - - 1 Flemish Ell, *F. E.*
5 Quarters of a Yard - 1 English Ell, *E.*

Note 1. The *Yard* is used in measuring all Sorts of *Woolen Cloths*, *wrought Silks*, most *Linens*, *Tape*, and *Gartering*.
2. The *Ell English* is used only in measuring some particular *Linens* called *Hollands*.
3. The *Ell Flemish* is used in measuring *Tapestry*.

EXAMPLES.

Yds.	*qrs.*	*na.*	*Ells.*	*qrs.*	*na.*	*Yds.*	*qrs.*	*na.*	*E.F.*	*qrs.*	*na.*
17	1	1	14	1	2	17	2	1	17	1	2
11	3	1	17	3	1	16	3	3	17	1	3
16	1	2	14	4	1	17	1	2	14	1	2
19	3	1	16	3	2	19	2	1	16	2	0
17	1	2	19	1	1	17	3	2	14	0	0
12	3	3	17	2	3	16	1	3	19	2	1
19	1	1	16	3	1	19	2	1	17	2	2
14	2	3	15	1	2	27	1	2	16	1	3

7. *Of* LAND-MEASURE.

Q. *Which are the Denominations of* Land-Measure?

A. 9 Square Feet, or *Ft.* - make 1 Yard, *Y.*
30 Yards and a Quarter - do. 1 Pole, *Po.*
40 Poles in Length and 1 in Breadth 1 Rood, *R.*
4 Roods - - - 1 Acre, *A.*

Q. *What is the Use of* Land-Measure?

A. It gives the Contents of any Piece of Ground in Acres.

EXAMPLES.

A.	*r.*	*p.*	*A.*	*r.*	*p.*	*A.*	*r.*	*p.*
17	3	12	17	1	12	26	1	36
11	2	19	11	2	13	13	2	22
15	1	21	16	3	27	23	3	13
16	1	12	19	1	16	36	2	28
17	2	11	12	3	14	22	2	33
13	2	12	16	1	11	19	0	19
11	1	17	17	3	14	33	3	16
21	3	21	12	1	11	17	2	24

8. *Of* LIQUID-MEASURE.

Q. *How many Sorts of* Liquid-Measure *are there?*

A. Two: *Wine-Measure* and *Winchester-Measure.*

Q. *What is meant by* Winchester-Measure?

A. It is a particular Measure used for Beer and Ale.

Q. *What is the difference between* Wine-Measure *and* Winchester-Measure?

A. A Gallon of Wine is 231 solid Inches; but a Gallon of *Beer* or *Ale* exceeds that Measure by 51 Inches, and is 282 solid Inches.

(1) *Of* WINE-MEASURE.

Q. *Which are the Denominations of* Wine-Measure?

A. 2 Pints, or *pts.* make 1 Quart, *qt.*
4 Quarts - 1 Gallon, *Gal.*
10 Gallons - 1 Anchor of Brandy or Rum, *An.*
18 Gallons - 1 Runlet, *R.*
31½ Gallons - 1 Barrel, *Bar.*
42 Gallons - 1 Tierce, *Tier.*
63 Gallons - 1 Hogshead, *hhd.*
84 Gallons - 1 Puncheon, *Pu.*
2 Hogsheads - 1 Pipe or Butt, *P.*
2 Pipes or 4 Hogsheads 1 Tun, *T.*

Q. *What other Liquors are measured by the* Wine-Standard?

A. All Brandies, Spirits, Strong Waters, Perry, Cyder, Mead, Vinegar, Honey and Oil.

Note, Milk *is also retailed by this* Standard *not by* Law, *but* Custom *only.*

EXAMPLES.

T.	*hhd.*	*gal.*	*qts.*	*Hhd.*	*gal.*	*qts.*	*Tier.*	*gal.*	*qts.*
7	1	12	2	27	10	2	27	12	1
6	3	31	3	22	13	3	29	17	3
7	1	41	2	26	11	3	22	11	2
6	2	17	1	29	12	2	27	31	3
7	3	14	3	23	22	0	29	12	1
1	2	19	1	27	32	2	27	11	2
9	1	15	2	29	27	3	26	17	1
3	1	11	2	26	33	2	22	11	3

(2) *Of* WINCHESTER-MEASURE.

Q. *Which are the Denominations of* Winchester-Measure?

A. 2 Pints, or *pts.* - make 1 Quart, *qt.*
4 Quarts - - 1 Gallon, *gal.*
8 Gallons - - 1 Firkin of Ale, *Fir.*
9 Gallons - - 1 Firkin of Beer, *Fir.*
2 Firkins - - 1 Kilderkin, *Kil.*
4 Firkins - . 1 Barrel, *Bar.*
1 Barrel and a Half or 54 Gall. 1 Hogshead of Beer, *hhd.*

Q. *What is the Difference between* Ale *and* Beer-Measure?

A. In *London* only they compute 8 Gallons to the *Firkin* of *Ale*, and 32 Gallons to the *Barrel*; but in all other Parts of *England*, for *Ale*, *Strong Beer*, and *Small Beer*, 34 Gallons are computed to the *Barrel*, and 8 Gallons and an Half to the *Firkin.*

Q. *What other Commodities are there that go by the* Winchester-Measure?

A. A Barrel of *Salmon* or *Eels* is 42 Gallons.
A Barrel of *Herrings* - 32 Gallons.
A Keg of *Sturgeon* - 4 or 5 Gallons.
A Firkin of *Soap* - 8 Gallons.

EXAMPLES.

Hhds.	*gals.*	*qts.*	*B.B.*	*fir.*	*gal.*	*Hhds*	*gals.*	*qts.*	*A.B.*	*fir.*	*gal.*
7	12	1	23	3	3	26	17	1	23	1	7
6	27	2	27	2	6	13	19	2	24	2	6
3	21	2	29	3	7	21	16	3	27	1	5
2	11	1	27	2	8	31	18	2	27	3	4
3	17	2	26	1	5	27	10	1	26	3	2
2	12	1	37	1	4	31	18	2	27	1	3
6	17	3	27	1	3	26	31	1	26	2	1
7	31	2	32	2	2	31	26	2	29	2	0

9. *Of* DRY-MEASURE.

Q. *Which are the usual Denominations of* Dry-Measure?

A. 2 Pints or *pts.* make 1 Quart, *qt.*
2 Quarts - 1 Pottle, *Pot.*
2 Pottles - 1 Gallon, *gal.*
2 Gallons - 1 Peck, *P.*
4 Pecks - 1 Bushel, *Bush.*
8 Bushels - 1 Quarter of Corn, *qr.*
36 Bushels - 1 Chaldron of Coals, *Ch.*

Q. *Wherein does* London *differ from other Places in* England *in the* Coal-Measure?

A. In *London* 36 Bushels make a Chaldron; but in all other Places 32 Bushels make a Chaldron. The Bushel also in Water-Measure contains 5 Pecks.

Q. *What other Denominations are there in* Dry Measure?

A. A Score of Coals is 21 Chaldrons.
A Sack of Coals - 3 Bushels.
A Sack of Corn - 4 Bushels.
10 Quarters of Corn make 1 Wey.
12 Weys - - 1 Last.
A Load of Corn is 5 Bushels.
A Cart-load ditto - 40 Bushels.

Q. *What is the use of* Dry Measure?

A. *Dry Measure* is applied to all dry Goods, as *Corns*, *Seeds*, *Fruit*, *Roots*, *Sand*, *Salt*, *Sea Coal*, *Charcoal*, *Smallcoal*, *Oysters*, *Muscles*, and *Cockles*.

Q. *What is the Standard for* Dry Measure?

A. The Standard for Dry Measure is a Winchester Bushel, being 18 Inches and a Half wide throughout and 8 Inches deep. One Gallon of this Quantity is 286 solid Inches and $\frac{4}{5}$, and consequently is less than an Ale Gallon by 13 solid Inches and $\frac{1}{5}$.

EXAM-

EXAMPLES.

Ch.	*bu.*	*p.*	*Qrs.*	*bu.*	*p.*	*Ch.*	*bu.*	*p.*	*Qrs.*	*bu.*	*p.*
17	11	3	14	7	2	27	10	1	36	7	3
16	10	2	16	1	1	17	12	2	43	6	2
19	11	1	19	3	2	24	21	1	32	3	3
17	12	3	16	1	1	31	32	2	37	2	2
16	19	3	17	3	2	71	19	1	26	5	2
17	11	1	16	1	1	16	12	2	28	4	3
17	11	3	12	3	1	17	31	3	33	7	0
11	14	1	37	2	3	16	14	1	42	3	2

10. *Of* TIME.

Q. *Which are the Denominations of* Time?

A. 60 Seconds, or *Sec.* make 1 Minute, *Min.*
60 Minutes - - 1 Hour, *Hr.*
24 Hours - - 1 Day, *Da.*
7 Days - - - 1 Week, *Wk.*
4 Weeks - - 1 Month, *Mo.*
13 Months, 1 Day and 6 Hours 1 common or Julian Year, *Yr.*

Q. *What is a* Solar Year?

A. According to the best Computations, a Solar Year is 365 Days, 5 Hours, 48 Minutes, and 55 Seconds.

Q. *How is the Year divided by the* Calendar?

A. No more Days than 30 hath th' Month of *September*;
The same may be said of *June*, *April*, *November*;
The rest of the Months are just 30 and one,
Except that short Month *February* alone,
Which to itself claimeth just 8 and a Score,
But in ev'ry Leap-Year we give it one more.

EXAMPLES.

M.	*w.*	*d.*	*H.*	*m.*	*sec.*	*M.*	*w.*	*d.*	*D.*	*h.*	*m.*	*sec.*
14	1	6	17	10	32	31	2	1	17	11	13	16
17	2	5	17	22	21	17	1	6	19	12	16	11
16	1	3	14	21	32	17	3	4	17	12	7	13
19	3	2	4	2	3	16	1	1	14	13	26	31
16	1	1	7	3	1	17	2	1	13	12	11	48
26	2	0	73	16	30	16	2	5	17	19	19	12
13	2	2	22	28	42	19	1	4	13	23	26	51

11. *Of*

11. *Of* MOTION.

Q. *Which are the Denominations* of Motion in the heavenly Bodies?

A. 60 Seconds, or ″ make 1 prime Minute, ′.
60 Minutes - 1 Degree, °.
30 Degrees - 1 Sign.
12 Signs, or 360 Degrees, make the whole great Circle of the Zodiac.

EXAMPLES.

°.	′.	″.	°.	′.	″.	°.	′.	″.
71	10	16	47	17	19	46	17	31
12	11	19	17	10	38	17	36	18
17	16	13	12	11	41	13	11	12
19	11	26	13	10	16	16	19	12
17	48	51	26	17	12	17	12	10
13	12	11	73	19	12	16	12	10
17	16	11	16	41	32	17	19	17
57	16	17	21	32	41	31	26	43

12. *Of Things bought and sold by the Tale.*

Q. *Which are the Denominations of Things accounted by the* Tale?

A. 12 Particulars make 1 Dozen.
12 Dozen - - 1 Gross.
12 Gross or 144 Dozen 1 great Gross.

Examples are needless.

Questions to exercise ADDITION.

1. A Man was born in the Year 1702, I demand when he will be 57 Years of Age?

2. There are two Numbers whose Difference is 17, and the lesser Number is 44; which is the greater Number?

3. A Man borrowed a Sum of Money, and paid in Part 12*l.* 10*s.* and the Remainder is 17*l.* 10*s.* I demand the Sum borrowed?

4. *A* owes me three Guineas. *B* 50*l.* 12*s.* *C* 104*l.* *D* three-score and seventeen Pounds. How much is due to me in all?

5. *A*, *B* and *C*, bought a Parcel of Goods. in the Purchase of which *A* laid out 3*l.* *B* 40*s.* and *C* 20*d.* How much was laid out in all?

6. A Man

6. A Man hath 6 Bags of Hops; the first weighs 2 *qrs.* 14*lb.* and each of the rest weighs 14 *lb.* more: What quantity hath he in the Whole?

7. A Man took an House for 12 Years, and by Agreement was to pay 100*l.* 10*s.* down; 190*l.* 4*s.* at the End of 6 Years; and 109*l.* 6*s.* at the End of 12 Years. I demand the whole Sum?

8. A Shopkeeper having opened a Shop, the first Week sold Goods to the Value of threescore Pounds, the next Week he took fourscore Pounds, but the third Week he took no more than thirty Shillings: How much did he receive in all?

Of SUBTRACTION.

Q. WHAT *is the Use of* Subtraction?

A. By taking a *less Number* from a *greater*, it shews the *Difference* between both.

Q. *How many Sorts of* Subtraction *are there?*

A. Two: *Simple* and *Compound.*

Of Simple SUBTRACTION.

Q. *What is* Simple Subtraction?

A. Simple or *Single Subtraction* is the finding a Difference between any two Numbers, whose Signification is the same; as the Difference between 6 Yards and 4 Yards, is 2 Yards.

Q. *How are Numbers to be placed in* Subtraction?

A. With *Units* under *Units*, *Tens* under *Tens*, &c. as in *Addition.*

Q. *What Rule have you for the Operation of* Subtraction in general?

A. When the lower *Number* is greater than the upper, take the lower *Number* from the *Number* which you borrow, and to that Difference add the upper *Number*, carrying one to the next lower Place.

Q. *What* Number *must you borrow when the lower* Number *is greater?*

A. The same which you stop at in *Addition.*

Q. *How do you prove* Subtraction?

A. By adding the Remainder and the lesser Line together, which will always be equal to the greater Line. Or,

By subtracting the Remainder from the greater Line, and that Difference will always be equal to the lesser Line.

EXAM-

EXAMPLES.

	£.	Yards.	Miles.	Days.	Months.
From	763	7694	41372	761214	7613471
Take	122	1867	13976	131812	2813126
Diff.					

	Hours.	lb.	Crowns.	Shillings.
From	31261812	312617127	71161871	7612641
Take	19879428	173121712	26571014	5910917
Diff.				

Of Compound SUBTRACTION.

Q. *What is* Compound Subtraction?

A. *Compound Subtraction* produces a Difference between any two Sums of divers Denominations.

1. *Of* MONEY.

EXAMPLES.

	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
From	14	10	6½	36	12	6½	76	12	6¾	31	18	4½
Take	3	17	8½	17	12	2¼	17	13	3¼	16	19	1
Diff.												

	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
Borr.	41	15	3	76	3	4½	73	7	6	17	12	1½
Paid.	14	17	1½	13	17	7	19	4	1½	14	7	2
Unpaid												

	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
Lent	136	11	6¼	47	17	6	413	11	7¾	71	18	9
Rec.	76	12	7¾	29	11	6¼	171	18	9½	17	16	10
Due												

Borrowe

	£.	s.	d.		£.	s.	d.
Borrowed	764	0	0	*Lent*	800	10	6
Paid at several Times	13	1	1½	*Received at several Times*	12	11	2¾
	17	4	2		19	12	6
	16	1	6¾		17	11	2½
	21	2	1		14	11	3
	19	11	10		19	12	2
	26	13	5¼		14	11	8¾
	11	19	6½		17	16	2½
	13	12	2½		46	12	7¾
Paid in all				*Received in all*			
Unpaid				*Remains due*			

2. TROY-WEIGHT.

	Oz.	dwt.	gr.	Oz.	dwt.	gr.	Oz.	dwt.	gr.	lb.	oz.	dwt.	gr.
From	71	12	12	71	12	18	13	16	12	84	4	11	12
Take	2	10	19	10	4	19	5	19	14	17	10	11	7
Diff.													

3. AVOIRDUPOIS-WEIGHT.

	C.	qrs.	lb	lb.	oz.	dr.	lb.	oz.	dr.	T.	C.	qr.	lb.
Bought	72	1	18	17	10	1	17	2	1	12	1	2	10
Sold	3	1	26	10	13	2	15	14	3	5	3	1	19
Unsold													

4. APOTHECARIES-WEIGHT.

	Oz.	dr.	sc.	gr.	Oz.	dr.	sc.	gr.	lb.	oz.	dr.	sc.	gr.
From	65	4	2	10	47	5	1	16	48	3	2	0	19
Take	7	7	2	12	2	1	2	18	10	1	2	2	17
Diff.													

5. LONG

5. LONG-MEASURE.

	Le.	m.	f.	p.	Yd.	ft.	in.	b. c.	Le.	m.	f.	p.
From	71	1	3	10	48	0	1	2	61	0	1	3
Take	14	2	5	16	12	0	3	1	17	1	2	20
Diff.												

6. CLOTH-MEASURE.

	Yd.	qr.	na.	E.	F.	qr.	na.
Bought	71	3	1	51	2	2	
Sold	14	2	3	16	1	3	
Unsold							

	Yd.	qr.	na.
A Draper bought	148	0	0
Sold at several Times.	14	1	2
	17	3	3
	19	1	2
	16	2	1
	17	3	3
Sold in all			
Unsold			

	Yd.	qr.	na.	E.	F.	qr.	na.
From	47	2	1	17	1	2	
Take	12	1	2	14	4	3	
Diff.							

7. LAND-MEASURE.

	A.	r.	p.	A.	r.	p.	A.	r.	p.	A.	r.	p.
Bought	12	1	10	17	3	17	28	1	7	32	0	9
Tilled	5	3	17	12	3	23	19	1	28	16	2	2
Untilled												

8. WINE-MEASURE.

	T.	hhds.	gals.	T.	hhds.	gals.	Gals.	qts.	pts.	Gals.	qts.	pts.
From	3	2	10	7	2	10	19	2	1	67	1	
Take	1	3	19	1	2	28	12	1	1	12	3	
Diff.												

9. WIN

9. WINCHESTER-MEASURE.

	Hhds.gals.qts.	*A.B. f. gal.*	*B.B. f. gals.*	*Hhds.gal.qts.*
Bought	17 10 1	17 2 1	48 1 3	41 2 2
Sold	12 11 2	14 1 3	17 1 7	23 3 3
Unfold				

10. DRY-MEASURE.

	Ch. bu. p.	*Ch. bu. p.*	*Qrs. bu. p.*	*Qrs. bu. p.*
From	17 2 1	40 1 2	19 1 1	26 1 3
Take	10 1 3	16 5 1	12 7 2	19 1 2
Diff.				

11. TIME.

	D. h. m. sec.	*W. d. h. m. sec.*	*W. d. h. m. sec.*
From	41 13 22 12	14 1 10 12 10	17 1 10 12 10
Take	22 16 33 31	10 3 19 48 26	10 2 14 6 15
Diff.			

12. MOTION.

	°. ′. ″.	°. ′. ″.	°. ′. ″.
From	48 10 12	47 2 10	62 13 9
Take	19 11 16	12 19 46	49 18 33
Diff.			

Questions to exercise SUBTRACTION.

1. A Man was born in the Year 1702, I demand his Age in the Year 1767?

2. There are two Numbers, the greater Number is 61, and the lesser Number is 44; I demand the Difference?

3. There are two Numbers whose Difference is 17, and the greater Number is 61; I demand the lesser Number?

4. The Brewer and the Baker drew Bills each upon the other, the Brewer stands indebted 45*l.* 19*s.* and the Baker 26*l.* and 6*d.* ½; who is the proper person indebted, and how much?

5. A Man borrowed 30*l.* and paid in Part 12*l.* 10*s.* I demand how much remains unpaid?

6. King *Charles* the Martyr was beheaded in the Year 1648; how many Years is it since?

7. *A* is indebted to the Brewer the Sum of 109*l.* 10*s.* *B* owes him 94*l.* 4*s.* 10*d.* $\frac{1}{2}$; how much does one owe more than the other?

8. What Sum is that which taken from 100*l.* leaves 48*l.* 7*s.* 6*d.* $\frac{1}{2}$?

9. There were 4 Bags of Money, containing as follows, *viz.* The first Bag 34*l.* the second Bag 50*l.* the third Bag 100*l.* and the fourth Bag 150*l.* which were to be paid to several Persons; but one of the Bags being lost, there were but 234*l.* paid; I demand which Bag was wanting?

Of MULTIPLICATION.

Q. WHAT *is* Multiplication?

A. It is a short Way of performing several *Additions.*

Q. *How many Parts are there in* Multiplication?

A. Three, *viz.*

1. The *Multiplicand*, or Sum to be multiplied.
2. The *Multiplier*, or Sum multiplied by.
3. The *Product*, or Total of the *Multiplicand*, as often as there are Units in the *Multiplier*.

Note. *The* Multiplicand *and the* Multiplier, *are also called* Factors; *and the* Product *the* Fact *or* Rectangle.

Q. *How many Sorts of* Multiplication *are there?*

A. Two, *viz.* *Simple* and *Compound.*

Of Simple MULTIPLICATION.

Q. *What is* Simple Multiplication?

A. Simple Multiplication is the multiplying of any two Numbers together, without Respect to their Signification; as 7 times 8 is 56.

Note 1. *As* Addition *and* Subtraction *of* Integers *are called* Simple Addition *and* Simple Subtraction; *so should* Multiplication *and* Division *of* Integers *be called* Simple Multiplication *and* Simple Division; *and that only should be called* Compound Multiplication *and* Compound Division, *which hath Numbers of divers Denominations to be either* multiplied *or* divided.

2. *The following* Table *must be learned perfectly by Heart, before you can proceed any further.*

The MULTIPLICATION TABLE.

3 times	3	is 9	5 times	6	is 30	11 times	3	is 33
	4	12		7	35		4	44
	5	15		8	40		5	55
	6	18		9	45		6	66
	7	21	6 times	6	36		7	77
	8	24		7	42		8	88
	9	27		8	48		9	99
4 times	4	16		9	54	12 times	3	36
	5	20	7 times	7	49		4	48
	6	24		8	56		5	60
	7	28		9	63		6	72
	8	32	8 times	8	64		7	84
	9	36		9	72		8	96
5 times	5	25	9 times	9	81		9	108

CASE I.

Q. *What do you observe in the* first Case *of* Multiplication?

A. That the Factors be placed one under another, in such Manner, that Units may stand under Units, Tens under Tens, &c. and then multiply as the Table directs.

EXAMPLES.

£.	*Crowns.*	*Days.*	*Hours.*
47613127	47613274	71261812	71261312
2	3	4	5

Minutes.	*Years.*	*Gallons.*	*Ounces.*
73126114	71312674	31261267	47612312
6	7	8	9

Shillings.	*Yards.*	*Bushels.*	*Ells.*
31261731	76138126	82365243	65423789
11	12	11	12

CASE 2.

Q. *What do you observe in the* second Case *of* Multiplication?

A. 1. When the *Multiplier* consists of more Figures than one, there must be made as many several *Products* as there are Figures contained in the *Multiplier.*

2. Let the first Figure of every *Product* be placed exactly under its *Multiplier.*

3. Add these Products together, and their Sum will be the total *Product.*

Q. *How do you prove* Multiplication?

A. Multiplication and *Division* do mutually prove each other; yet *Multiplication* may as truly be proved by itself by inverting the Factors.

EXAMPLES.

Crowns.	*Days.*	*Weeks.*	*Pence.*
691861	129186	281216	181281
26	98	978	763
17988386	12660228	275029248	138317403

Ounces.	*Yards.*	*Pints.*	*Quarts.*
269181	261986	812617	281691
4629	7638	43859	76286
1246038849	2001049068	35640569003	21489079626

Q. *What* Exceptions *have you to this* Case?

A. 1. When these Figures 1 and 1, or 1 and 2, happen together in the Multiplier, you may multiply by both at once, as in Case 1.

EXAMPLES.

Weeks.	*Bushels.*	*Grains.*	*Leagues.*
761312	671612	963458	843126
412	114	912	119
113660544	76563768	878673696	100331994

2. When any other Number between 12 and 20 happens, as 13, 14, 15, &c. then multiply by the Figures in Units Place, and as you multiply, add to the Product of each single Figure that of the Multiplicand, which stands next on the right Hand.

EXAM-

EXAMPLES.

Gallons.	*Days.*	*Months.*	*lb.*
4721217	4713176	4621261	4713761
15	16	17	18

CASE 3.

Q. *What do you observe in the* third Case *of* Multiplication?

A. 1. Such *Factors* as have *Ciphers* at the Ends, must be set one under another, as if there were no *Ciphers*.

2. The *Ciphers* placed at the End of either, or both of the *Factors* are to be omitted till the last Product, and then the same Number of *Ciphers* must be annexed to it.

EXAMPLES.

Pence.	*Hours.*	*Years.*
476000	180120	461210
170	48100	81900
80920000	8663772000	37773099000

Nails.	*Inches.*	*Barrels.*
760000	461200	618010
4800	72000	74210
3648000000	33206400000	45862522100

CASE 4.

Q. *What do you observe in the* fourth Case *of* Multiplication?

A. When *Ciphers* are placed between the significant *Figures* of the *Multiplier*, they must be omitted in the Operation; Regard being had to the first Figure of every particular *Product* as before.

EXAMPLES.

Gallons.	*Eggs.*	*Buttons.*
128121	128128	246145
72001	70043	60012
9224840121	8974469504	14771653740

CASE 5.

Q. *How do you multiply by the* Parts *of any Number instead of the whole?*

A. When the *Multiplier* is such a Number, that any two Figures being multiplied together, will make the said *Multiplier*, it is shorter to multiply the given Number by one of those Figures, and that Product by the other; as 5 times 7 is 35.

EXAMPLES.

£.	Men.	Soldiers.	Sailors.
764126	764131	461231	461312
35	48	72	36
26744410	36678288	33208632	16607232

Of Compound MULTIPLICATION.

Q. *What is* Compound Multiplication?

A. When several Numbers of divers Denominations are given to be Multiplied by one common *Multiplier;* this is called *Compound Multiplication.*

£.	s.	d.	lb.	oz.	dwt.	gr.	C.	qr.	lb.	lb.	oz.	dr.
17	3	1¼	17	5	12	16	43	1	14	17	12	10
		2				3			4			5

M.	f.	p.	Yds.	f.	in.	b.	c.	Yds.	qr.	na.	B.B.	fir.	gal.
16	4	21	17	3	3	1		16	3	2	17	2	3
		6				7				8			9

Ch.	bu.	p.	M.	w.	d.	D.	h.	m.	sec.	°.	'.	".
16	12	3	16	3	4	17	14	14	15	16	11	13
		10			11				12			7

Note, *If the Learner be taught to turn back to the Bills of Parcels in* Addition, *he will find Plenty of Examples in* Compound Multiplication.

Questions

Questions to exercise MULTIPLICATION.

1. If one Man's Pay be 3*s.* what must 40 Men have?

2. What is the Product of 76 multiplied by 3 and by 7?

3. There are 124 Men employed to finish a Piece of Work, and they are to have 3*l.* each Man; I demand how much they must all have?

4. An Army of 10000 Men having plundered a City, took so much Money, that when it was shared amongst them, each Man had 27*l.* I demand how much Money was taken in all?

5. There were 40 Men concerned in the Payment of a Sum of Money, and each Man paid 1271*l.* how much was paid in all?

6. If one Foot contains 12 Inches, I demand how many Inches there are in 126 Feet?

7. What is the Product of 769 multiplied by 9 and by 7?

Of DIVISION.

Q. WHAT *is* Division?

A. It is a short Way of performing several *Subtractions*, and shews how oft one Number is contained in another, and what remains.

Q. *How many Parts are there in* Division?

A. Four, *viz.*

1. The *Dividend*, or Sum to be divided.
2. The *Divisor*, or Sum divided by.
3. The *Quotient*, or Answer to the Question.
4. The *Remainder*, which is always less than the *Divisor*, and of the same name with the *Dividend*.

Note, *The* Divisor, Dividend *and* Quotient *are certain; but the* Remainder *is uncertain, because some Operations in* Division *have no Remainder.*

Q. *How many Sorts of* Division *are there?*

A. Two; *Simple* and *Compound.*

Of Simple DIVISION.

Q. *What is* Simple Division?

A. Simple Division is when the *Divisor* and *Dividend* are made choice of, without any Regard to their Signification; as 56 divided by 7 gives 8 for the Quotient; or the Number 7 is contained in 56, eight times.

Q. *How many Sorts of* Simple Division *are there?*

A. Two; *Short Division* and *Long Division.*

Of Short DIVISION.

Q. *What is* Short Division?

A. Short Division is when the *Divisor* does not exceed 12.

EXAM-

EXAMPLES.

Minutes.	*Months.*	*Days.*
2)71313674(	6)312610841(	11)7312613107(
3)42310812(	7)713126719(	12)3813617314(
4)13812612(	8)701267131(	11)1612798131(
5)61231281(	9)126713180(	12)1731261712(

Q. *How is* Division *proved?*

A. Multiply the *Divisor* and *Quotient* together, and the *Remainder* (if there be any) add to the Product; that Sum will be equal to the *Dividend.*

Of LONG DIVISION.

CASE I.

Q. *What is* Long Division?

A. When the *Divisor* is more than 12, for the Help of the Memory, we are obliged to multiply the *Quotient* Figure and *Divisor* together, and subtract that Product from the *Dividend*, in Order to find out the *Remainder;* which Operation must be continued to every *Quotient* Figure: And this is called *Long Division.*

EXAMPLES.

Yards.	*Shillings.*	*Pence.*
91)71265871(	28)71261714(	1217)31917312(
82)31712617(	19)73126171(	3164)12697126(
73)17312618(	381)13261714(	6128)71217312(
64)47312617(	773)31746173(	2912)47161231(
55)73181064(	937)13189714(	33108)91261814(
46)76131714(	761)12816176(	71216)17131716(
37)31231712(	7618)18917312(	86257)34175362(

CASE 2.

Q. *What do you observe of* Cyphers *placed at the End of the* Divisor?

A. 1. They must be cut off; and the same Places also must be cut off in the *Dividend.*

2. Those Figures which are cut off in the *Dividend*, must be annexed to the *Remainder* at last.

EXAMPLES.

Yards.	*Crowns.*
625|00)712613|12(	128|000)71126|071(
426|00)713121|74(	412|000)71613|181(

CASE

CASE 3.

Q. *How do you divide by the* Parts *of any Number instead of the* Whole?

A. When the *Divisor* is such a Number that any two Figures being multiplied together, will make the said *Divisor*, it is shorter to divide the given Number by one of those Figures, and that *Quotient* by the other; as 5 times 7 is 35.

EXAMPLES.

Pence.	*Crowns.*	*Pounds.*
35)26744410(	48)36678288(	72)33208652(

Of Compound DIVISION.

Q. *What is* Compound Division?

A. When several Numbers of divers Denominations are given to be divided by one common *Divisor;* this is called *Compound Division.*

l. s. d	*lb. oz. dwt. gr.*	*T. C. qr. lb.*
2)48 12 6½(	3)14 10 3 16(	4)17 1 1 14(
lb. oz. dr.	*M. f. p.*	*Yds. f. in. b. c.*
5)46 12 10(	6)38 2 14(	7)46 0 10 2(
Yds. qr. na.	*A.B. fir. gal.*	*Ch. bu. p.*
8)16 2 2(	9)17 3 1(	10)20 13 2(
M. w. d.	*D. h. m. sec.*	°. ′. ″.
11)48 2 2(	12)46 16 12 30(	12)33 4 11(

Questions to exercise DIVISION.

1. If 140*s.* be divided amongst 40 Men, how much a piece?
2. If 1596 be divided by 21, what is the Quotient?
3. There are 124 Men, who have 372*l.* among them, how much must each Man have?
4. An Army of 19000 Men having plundered a City, took 266000*l.* how much must each Man have?
5. There was a certain Number of Men concerned in the Payment of 1272*l.* and each Man paid 3*l.* I demand the Number of Men?
6. What is the Quotient of 48447, divided by 9 and by 7?
7. If 3264 be divided by 12 and by 4, what is the Quotient?
8. A certain Man intending to go a Journey of about 3264 Miles, would compleat the same in 136 Days; I demand how many Miles he must travel each Day?

Of

Of REDUCTION.

Q. WHAT *is* Reduction?

A. Reduction is the bringing or reducing Numbers of one Denomination into other Numbers of another Denomination, but of the same Value?

Q. *How are Denominations of any Kind reduced from one to another?*

A. By *Multiplication* and *Division.*

Q. *When is* Multiplication *to be used?*

A. When great Names are to be brought into small; as *Pounds* into *Shillings*, or *Days* into *Hours*; and this is called *Reduction descending.*

Q. *When is* Division *to be used?*

A. When small Names are to be brought into great; as *Shillings* into *Pounds*, or *Hours* into *Days*; and this is called (though improperly) *Reduction Ascending.*

Note, *Whether you* multiply *or* divide, *it must be by as many of the* less, *as make one of the* greater *Denomination.*

Q. *How are questions in* Reduction *proved?*

A. By varying the Order of them.

Of MONEY.

REDUCTION *Descending.*

1. In 46*l.* how many *Shillings* and *Pence?* *Answ.* 920*s.* 11040*d.*

46*l.*
20
———
920*s.*
12
———
11040*d.*
———

2. In 7*l.* how many *Shillings* and *Pence?* *Answ.* 140*s.* 1680*d.*

3. In 9*l.* how many *Shillings*, *Pence* and *Farthings?* *Answ.* 180*s.* 2160*d.* 8640 *qrs.*

4. In 7*l.* 14*s.* 6*d.*$\frac{1}{4}$, how many *Farthings?* *Answ.* 7417 *qrs.*

5. Reduce 46*l.* 14. 9*d.*$\frac{3}{4}$, into *qrs.* *Facit* 44871 *qrs.*

6. Reduce 50*l.* 9*s.* 9*d.*$\frac{1}{2}$, into *Half-pence.* *Facit* 24235 *Half-pence.*

7. Reduce 160*l.* 15*s.* 6*d.* into *Sixpences.* *Facit* 6431 *Sixpences.*

8. Reduce 48*l.* 12*s.* 8*d.* into *Groats.* *Facit* 2918 *Groats.*

9. Reduce 90*l.* 17*s.* 6*d.* into *Two-pences.* *Facit* 10905 *Two-pences.*

10. In 12 *Crowns*, how many *Shillings* and *Pence?* *Answ.* 60*s.* 720*d.*

11. In 15*l.* how many *Crowns* and *Shillings?* *Answ.* 60 *Cr.* 300*s.*

12. In 50 *Half-Crowns*, how many *Pence* and *Farthings?* *Answ.* 1500*d.* 6000 *qrs.*

13. In 306 *Crowns*, how many *Half-Crowns* and *Pence?* *Answ.* 612 *Half-Crowns*, 18360*d.*

14. Reduce 120 *Six-pences*, into *Three-pences*, *Pence* and *Farthings.* *Facit* 240 *Three-pences*, 720*d.* 2880 *qrs.*

15. Reduce 210 *Crowns*, into *Shillings*, *Groats*, and *Pence.* *Facit* 1050*s.* 3150 *Groats*, 12600*d.*

16. Reduce 86 *Pounds*, into *Crowns*, *Shillings*, and *Groats.* *Facit* 344 *Cr.* 1720*s.* 5160 *Groats.*

17. How many *Shillings* and *Pence* are in 17 *Guineas?* *Answ.* 357*s.* 4284*d.*

18. How many *Crowns* and *Six-pences* are in 28 *Pounds?* *Answ.* 112 *Cr.* 1120 *Six-pences.*

REDUCTION *Ascending.*

1. In 11040*d.* how many *Shillings* and *Pounds?* *Answ.* 920*s.* 46*l.*

2|0
12)11040(92|0(46*l.*

2. In 1680*d.* how many *Shillings* and *Pounds?* *Answ.* 140*s.* 7*l.*

3. In 8640 *qrs.* how many *Pence*, *Shillings*, and *Pounds?* *Answ.* 2160*d.* 180*s.* 9*l.*

4. In 7417 *qrs.* how many *Pounds?* *Answ.* 7*l.* 14*s.* 6*d.* $\frac{1}{4}$.

5. Reduce 44871 *qrs.* into *Pounds.* *Facit* 46*l.* 14*s.* 9*d.* $\frac{3}{4}$.

6. Reduce 24235 *Half-pence* into *Pounds.* *Facit* 50*l.* 9*s.* 11*d.* $\frac{1}{2}$.

7. Reduce 6431 *Six-pences* into *Pounds.* *Facit* 160*l.* 15*s.* 6*d.*

8. Reduce 2918 *Groats* into *Pounds.* *Facit* 48*l.* 12*s.* 8*d.*

9. Reduce 10905 *Two-pences* into *Pounds.* *Facit* 90*l.* 17*s.* 6*d.*

10. In 720*d.* how many *Shillings* and *Crowns?* *Answ.* 60*s.* 12 *Cr.*

11. In 300*s.* how many *Crowns* and *Pounds?* *Answ.* 60 *Cr.* 15*l.*

12. In 6000 *qrs.* how many *Pence* and *Half-Crowns?* *Answ.* 1500*d.* 50 *Half-Crowns.*

13. In

13. In 18360*d.* how many *Half-Crowns* and *Crowns?* *Answ.* 612 *Half-Cr.* 306 *Cr.*

14. Reduce 2880 *qrs.* into *Pence*, *Three-pences* and *Six-pences.* *Facit* 720*d.* 240 *Three-pences*, 120 *Six-pences.*

15. Reduce 12600*d.* into *Groats*, *Shillings* and *Crowns.* *Facit* 3150 *Gr.* 1050*s.* 210 *Cr.*

16. Reduce 5160 *Groats*, into *Shillings*, *Crowns* and *Pounds.* *Facit* 1720*s.* 344 *Cr.* 86*l.*

17. How many *Shillings* and *Guineas* are in 4284 *Pence?* *Answ.* 357*s.* 17 *Guineas.*

18. How many *Crowns* and *Pounds* are in 1120 *Six-pences?* *Answ.* 112 *Cr.* 28*l.*

REDUCTION *Ascending* and *Descending.*

1. In 720 *Shillings*, how many *Pence* and *Crowns?* *Answ.* 8640*d.* 144 *Cr.*

720*s.*
12
———
6|0)864|0(144 *Crowns.*

2. In 120 *Shillings*, how many *Crowns* and *Half-Crowns?* *Answ.* 24 *Cr.* 48 *Half-Cr.*

3. In 60 *Crowns*, how many *Shillings* and *Pounds?* *Answ.* 300*s.* 15*l.*

4. In 612 *Half-Crowns*, how many *Crowns* and *Pence?* *Answ.* 306 *Cr.* 18360*d.*

5. In 40 *Guineas*, how many *Shillings*, *Crowns* and *Pounds?* *Answ.* 840*s.* 168 *Cr.* 42*l.*

6. Reduce 12600 *Pence*, into *Shillings*, *Groats* and *Crowns.* *Facit* 1050*s.* 3150 *Gr.* 210 *Cr.*

7. Reduce 63 *Crowns* into *Shillings* and *Guineas.* *Facit* 315*s.* 15 *Guineas.*

8. Reduce 70 *Moidores* into *Pounds.* *Facit* 94*l.* 10*s.*

9. Reduce 12180 *Three-pences*, into *Shillings*, *Pence* and *Groats.* *Facit* 3045*s.* 36540*d.* 9135 *Gr.*

10. How many *Crowns*, *Groats*, and *Pounds* are in 1720*s?* *Answ.* 344 *Cr.* 5160 *Gr.* 86*l.*

11. How many *Groats*, *Three-pences* and *Six-pences* are in 121 *Shillings?* *Answ.* 363 *Gr.* 484 *Three-pences*, 242 *Six-pences.*

12. How many *Pounds* and *Crowns* are in 1120 *Six-pences?* *Answ.* 28*l.* 112 *Cr.*

13. How many *Crowns*, *Half-Crowns* and *Shillings* are in 280*l.* and the Number of each equal? *Answ.* 658, and 7*s.*

14. Four

14. Four Men brought each 17*l.* 10*s.* Value in Gold into the Mint to be coined into *Guineas*, how many must they have? *Answer* 66 *Guineas*, 14*s.*

15. There are 12 Purses, with each 12 *Guineas*, how much *Sterling* is the Sum? *Answ.* 151*l.* 4*s.*

16. A certain Ground Tenant was behind with his Landlord for 16 Year's Rent, at 5*l.* 10*s.* a Year, how much was the Debt? *Answ.* 88*l.*

17. There are 34*l.* 17*s.* to be divided among 17 Men, how much is it a piece? *Answ.* 2*l.* 1*s.*

18. In 19 *Moidores*, how many *Pounds Sterling?* *Answ.* 25*l.* 13*s.*

Of TROY-WEIGHT.

1. In 47 *lb.* 10 *oz.* how many *Grains?* *Answ.* 275520 *gr.*

2. In 47128 Grains of Gold, how many *lb.?* *Answ.* 8*lb.* 2 *oz.* 3 *dwts.* 16 *gr.*

3. In 10 *lb.* of Silver, how many Spoons, each 5 *oz.* 10*dwts.?* *Answ.* 21 *Spoons*, and 90 *dwts.* over.

4. In 4560 Grains of Gold how many Tea-Spoons, each half an Ounce? *Answ.* 19 *Tea-Spoons.*

5. In 47 Salvers, each 20 *oz.* how many *lb.?* *Answ.* 78 *lb.* 4 *oz.*

6. How many Porringers, each 11 *oz.* are in 19 *lb.* 10 *oz.* 11*dwts.* of Silver? *Answ.* 21 *Porringers*, and 151 *dwts.* over.

7. A Goldsmith having 3 Ingots of Silver, each weighing 27 *oz.* was minded to make them into Spoons of 2 *oz.* Cups of 5 *oz.* Salts of 1*oz.* and Snuff-boxes of 2 *oz.* and to have an equal Number of each; the Question is, what was that Number? *Answ.* 8 of each Sort and 1*oz.* over.

8. In 17 Ingots of Silver, each 27 *oz.* 10 *dwts.* how many Grains? *Answ.* 224400 *gr.*

Of AVOIRDUPOIS-WEIGHT.

Q. *Which are the* Allowances *usually made in* Avoirdupois *Great Weight to the Buyer?*

A. They are *Tare*, *Trett*, and *Cloff.*

Q. *What is* Tare?

A. Tare is an Allowance made to the *Buyer*, for the Weight of the *Box*, *Bag*, *Vessel*, or whatever else contains the Goods bought; and is either,

1. At so much *per Bag*, *Barrel*, *Box*, *&c.*
2. At so much *per Cent*, or
3. At so much in the *Gross* Weight, called *Invoice* Tare.

Q. *What is* Trett?

A. Trett is an Allowance made by the Merchant to the Buyer of 4 *lb.* in 104 *lb.* that is, the six and twentieth Part for Waste and Dust, in some Sort of Goods.

Note. *If an Allowance be made both for* Tare *and* Trett, *in the same Parcel of Goods, the* Tare *is first to be deducted; and that Remainder is called* Suttle Weight.

Q. *What is* Cloff?

A. Cloff is an Allowance of 2 *lb.* Weight to the Citizens of *London*, on every Draught above 3 *C.* Weight, on some Sorts of Goods; as *Galls, Madder, Sumac, Argol, &c.*

Q. *What are these Allowances called beyond the Seas.*

A. They are called the *Courtesies of London;* because they are not practised in any other Place.

Q. *What is* Gross Weight?

A. Gross is the weight of any Sort of Merchandize, and that which contains it, being weighed both together.

Q. *What is Neat Weight?*

A. Neat is the pure Weight of the Goods, after all Allowances are deducted.

Note 1. Raw, Long, Short, China, Morea-Silk, &c. *are weighed by a great Pound of* 24 *oz. But* Ferret, Filosella, Sleeve-Silk, &c. *by the common Pound of* 16 *oz.*

2. To bring great Pounds into common, multiply by 3, and divide by 2.
3. To bring common Pounds into great, multiply by 2, and divide by 3.

CASE I.

EXAMPLES.

1. In 7 *C.* 3 *qrs.* 10 *lb.* how many *oz.* and *dr.*? *Answ.* 14048 *oz.* 224768 *dr.*

2. In 3 Tons of Iron, how many *C. qrs.* and *lb.*? *Answ.* 60 *C.* 240 *qr.* 6720 *lb.*

3. In 14048 *oz.* how many *C.*? *Answ.* 7 *C.* 3 *qr.* 10 *lb.*

4. In 6720 *lb.* of Iron, how many Tons? *Answ.* 3 *Tons.*

5. In 461 great Pounds of Morea Silk, how many *oz.* and *dr*? *Answ.* 11064 *oz.* 177024 *dr.*

6. In 40426 Drams of Silk, how many great Pounds? *Answ.* 105 *great Pounds*, 6 *oz.* 10 *dr.*

7. In 3 *lb.* of Cinnamon, how many Parcels, each 12 *oz.*? *Answ.* 4 *Parcels.*

8. In 470 Parcels of Sugar, each 26 *lb.* how many *C.*? *Answ.* 109 *C.* 0 *qrs.* 12 *lb.*

9. In

9. In 672 great Pounds of Silk, how many common Pounds? *Answ.* 1008 *common lb.*

10. In 480 common Pounds of Silk, how many great Pounds? *Answ.* 320 *great lb.*

11. In 8 Hogsheads of Tobacco, each weighing neat 7 *C.* $\frac{1}{2}$, how many Pounds? *Answ.* 6720 *lb.*

12. In 17 Pigs of Lead, each weighing 4 *C.* $\frac{3}{4}$ how many Fother, at 19 *C.* $\frac{1}{2}$? *Answ* 4 *Fother* 2 *C.* 3 *qrs.*

13. In 712 *C.* of Lead, how many Fother? *Answ.* 36 *Fother,* 10 *C.*

14. In 17 *C.* 1 *qr.* 6 *lb.* of Sugar, how many Parcels, each 17 *lb.*? *Answ.* 114 *Parcels.*

CASE 2.

Of TARE *and* TRETT, *&c.*

Note. If the Teacher approves of it, he may introduce this and the following Cases after Practice instead of this Place.

Q. *When the* Tare *is at so much* per Barrel, Bag, *&c. how is the* neat Weight *found?*

A. Multiply the Number of the said *Barrels, Bags,* &c. by the Tare, and subtract that Product from the *Gross;* the Remainder is the *Neat.*

Note 1. The Table of Allowance for *Tare,* in the Book of Rates, says;

For *Cyprus* and *Smyrna* Silk.

			lb.
Bales	about or above 300 lb.	The Tare per Bale is	16
	from 300 to 200.		14
	from 200 downwards.		12

For *Virginia* Tobacco.

Hhds.	5 *C.* and upwards.	The Tare per Hhd. is	100
	from 5 to 4 *C.*		90
	from 4 to 3 *C.*		80
	under 3 *C.*		70

Sugar from *India.*

In Casks and Canisters.	Tare	$\frac{1}{6}$
In Chests and Casks from St. *Thome*		$\frac{1}{3}$

Oil from *Candia.*

Tare 29 lb. per Barrel.

2. 7 lb. $\frac{1}{2}$ of Oil make a Gallon; therefore to reduce *Pounds* into *Gallons* multiply by 2, and divide by 15.

EXAMPLES.

1. In 16 Hogsheads of Tobacco, each 5 *C.* 1 *qr.* 19 *lb.* Gross, Tare *per* Hogshead 100 *lb.* now much Neat Weight? *Answ.* 72 *C.* 1 *qr.* 20 *lb.*

C.

	C.	qr.	lb.	
	5	1	19	
			4	*by the Parts.*
	21	2	20	
			4	
Gross	86	2	24	
Tare	14	1	4	
Neat	72	1	20	

16
100
——4 C. qr. lb.
28)1600(57(14 1 4

2. In 70 Bales of *Smyrna* Silk, each 317 *lb.* Gross, Tare *per* Bale 16 *lb.* how many *lb.* Neat? *Answ.* 21070 *lb. Neat.*

3. In 14 Hogsheads of Tobacco, weighing Gross 89 *C.* 3 *qrs.* 17 *lb.* Tare per Hogshead 100*lb.* how much neat Weight? *Answ.* 77*C.* 1*qr.* 17 *lb.*

4. What is the Neat Weight of 30 Bales of *Cyprus* Silk, each weighing 249*lb.* Gross, Tare *per* Bale 14*lb.*? *Answ.* 7050*lb.*

CASE 3.

Q. *When the* Tare *is at so much* per Cent. *how is the* Neat Weight *found?*

A. When the *Tare* is an aliquot Part or Parts of the *C.* Weight, divide the whole Gross by the said Part or Parts that the Tare is of an *C.* Weight, and the Quotient thence arising gives the Tare of the Whole; which subtract from the whole Gross, the Remainder is *Neat.*

Note 1. Figs, Almonds, Argol, &c. - - - - 14 lb. } per Cent.
Carroteels, Butts of Currants, &c. 16 }
Oil in uncertain Casks, &c. 18 }

2. Whatever Part the given Tare is of an *C.* Weight, the same must the whole *Tare* be of the given *Gross Weight.*

EXAMPLES.

1. What is the Neat Weight of 12 Barrels of Argol, Gross 48*C.* 3*qrs.* 12*lb.* Tare 14*lb. per Cent?* *Answ.* 42*C.* 3*qrs.*

	C.	qrs.	lb.	
14=$\frac{1}{8}$)48	3	12		*Gross.*
	6	0	12	*Tare.*
	42	3	0	*Neat.*

2. In 12 Butts of Currants, each 7*C.* 1*qr.* 10*lb.* Gross, Tare *per Cent.* 16*lb.* how much Neat Weight? *Answ.* 75 *C.* 1 *qr.* 26 *lb.* 14 *oz.*

3. What

3. What is the Neat Weight of 30 Barrels of Figs, each 2 *C.* 3 *qrs.* Gross, Tare *per Cent.* 14*lb.*? *Answ.* 72 *C.* 21*lb.*

Note. When the *Tare* is not the aliquot Part or Parts of an *C.* Weight, then multiply the *Pounds Gross* by the *Tare per Cent.* given, and that Product divide by 112, the Quotient is the whole *Tare*, which subtract from the *Gross*, the Remainder is *Neat.*

4. What is the Neat Produce of 20 Barrels of Anchovies, each Gross 33*lb.* Tare *per Cent.* 10*lb.*? *Answ.* 601*lb.* 2 *oz.*

5. What is the Neat produce of 17 Barrels of Pot-Ash, each Gross 203*lb.* Tare 10*lb. per Cent.*? *Answ.* 3142*lb.* 14 *oz.*

CASE 4.

Q. *When the* Tare *is at so much in the whole* Gross Weight; *how is the* Neat Weight *found?*

A. Subtract the *Tare* from the *Gross*, and the *Remainder* is *Neat.*

EXAMPLES.

1. What it the Neat Weight of 38 Hogsheads of Tobacco, weighing Gross 201 *C.* 3 *qrs.* 12 *lb.* Tare in the Whole 3140 *lb.* *Answ.* 173 *C.* 3 *qrs.* 8 *lb.*

2. What is the Neat Weight of 3 Hogsheads of Tobacco, weighing as follows, *viz.*

	C.	*qrs.*	*lb.*		*lb.*
No. 1 —	3	1	2	Tare	80
2 —	3	2	1		80
3 —	5	1	12		100?

Answ. 9 *C.* 3 *qrs.* 7*lb.*

CASE 5.

Q. *How is the* Neat Weight *found, when* Trett *is allowed with* Tare?

A. Divide the *Pounds Suttle* by 26, the Quotient is the *Trett*, which subtract from the *Suttle*, the Remainder is *Neat.*

EXAMPLES.

1. In 8 *C.* 3*qrs.* 20*lb.* Gross, Tare 38*lb.* Trett 4*lb. per* 104 *lb.* how many *lb.* Neat? *Answ.* 925 *lb. Neat.*

2. In 177*C.* 0*qr.* 22*lb.* Gross, Tare 9*lb. per Cent.* Trett 4 *lb. per* 104*lb.* how many *C. Weight Neat?* *Answ.* 156 *C.* 2 *qrs.* 22*lb.*

3. In 17 Chests of Sugar, weighing 120 *C.* 2 *qrs.* Gross, Tare 176*lb.* Trett 4*lb. per* 104*lb.* how many *C.* Weight Neat? *Answ.* 114*C.* 1 *qr.* 12*lb.*

Note. There are other Allowances, not so common, such as *Break*, which is at so much *per* Barrel, Bag, &c. and *Damage*, which is so much in the Whole, but they are very easy.

Of APOTHECARIES-WEIGHT.

1. In 12lb. 1 *oz.* 2 *dr.* 0 *sc.* 1 gr. how many Grains? *Answ.* 9721 *Grains.*

2. In

2. In 69721 Grains, how many *sc. dr. oz.* and lb.? *Answ.* 12 lb. 1 *oz.* 2 *dr.* 0 *sc.* 1 gr.

Of LONG-MEASURE.

1. In 70 Miles how many Furlongs and Poles? *Answ.* 560 *Furlongs*, 22400 *Poles.*

2. In 40 Yards how many Feet, Inches and Barly-corns? *Answ.* 120 *Feet*, 1440 *Inches*, 4320 *Barly-corns.*

3. In Five Miles how many Barly-corns? *Answ.* 950400 *Barly-corns.*

4. In 400 Inches how many Yards? *Answ.* 111 *Yds.* 4 In.

5. In 4 Leagues how many Yards? *Answ.* 21120 *Yards.*

6. In 15840 Yards, how many Miles and Leagues? *Answ.* 9 *Miles*, 3 *Leagues.*

7. How many Barly-corns in a Mile? *Ans.* 190080 *Barly-corns.*

8. How many Times doth the Wheel, which is 18 Feet 6 Inches round, turn between *London* and *York*, which is 150 *Miles?* *Answ.* 42810 *Times*, and 180 *Inches over.*

9. How many Barly corns will reach round the Globe of the Earth, which is 360 Degrees, and each Degree 69 Miles and an half? *Answ.* 4755801600 *Barly-corns.*

Of CLOTH-MEASURE.

1. In 14 Yards how many Quarters and Nails? *Answ.* 56 *Qrs.* 224 *Nails.*

2. In 17 *Yds.* 1 *qr.* 2 *na.* how many Nails? *Answ.* 278 *na.*

3. In 4712 Nails, how many Yards? *Answ.* 294 *yds.* 2 *qrs.*

4. In 47128 Nails of *Irish* Cloth, how many Pieces, each 12 Yards? *Answ.* 245 *Pieces*, 5 *yds.* 2 *qrs.*

5. In 4 Pieces of Cloth, each 14 Yards, how many Quarters and Nails? *Answ.* 224 *qrs.* 896 *na.*

6. In 10 Bales of Cloth, each 10 Pieces, each 12 Yards, how many Yards? *Answ.* 1200 *yds.*

7. In 7000 Nails of Holland how many Ells? *Answ.* 350 *Ells.*

8. Reduce 42 Ells into Quarters and Nails. *Facit* 210 *qrs.* 840 *Nails.*

Of LAND-MEASURE.

1. In 40 Acres, how many Roods and Perches? *Answ.* 160 *Roods*, 6400 *Perches.*

2. In 17 *A.* 3 *r.* 10 *p.* how many Perches? *Answ.* 2850 *per.*

3. Reduce 2850 Perches into Acres. *Facit* 17 *A.* 3 *r.* 10 *p.*

4. If a Piece of Ground contains 24 Acres, and an Inclosure of 17 Acres 3 Roods be taken out of it, how many Perches are there in the Remainder? *Answ.* 1000 *Perches.*

5 On

5. One Field contains 7 Acres, another 10 Acres, and a third 12 Acres 1 Rood, how many Shares of 76 Perches each are contained in the Whole? *Answ.* 61 *Shares* and 44 *Perches over.*

Of LIQUID-MEASURE.

1. In 17 Gallons how many Quarts and Pints? *Answ.* 68 *qts.* 136 *pints.*

2. In 10 Barrels of Beer, how many Gallons and Quarts? *Answ.* 360 *Gals.* 1440 *Qts.*

3. In 4 Barrels of Ale, how many Gallons? *Answ.* 128 *Gals.*

4. In 72 Hogsheads of Beer, how many Barrels? *Answ.* 108 *Barrels.*

5. In 91 Barrels of Beer, how many Hogsheads? *Answ.* 60 *Hhds.* 36 *Gals.*

6. If a Back contains 30 Barrels of Beer, how many Gallons doth it hold? *Answ.* 1080 *Gal.*

7. In 4 Tons of Oil, now many Hogsheads, Gallons, and Quarts? *Answ.* 16 *Hhds.* 1008 *gals.* 4032 *qts.*

8. In 3 Hogsheads of Brandy, how many half Anchors? *Answ.* 37 *half Anchors,* 4 *Gals.*

9. In 1712 Gallons of Wine, how many Hogsheads? *Answ.* 27 *Hhds.* 11 *gals.*

10. If a Vintner be desirous to draw off a Pipe of Canary into Bottles containing Pints, Quarts and 2 Quarts, and of each an equal Number, how many must he have? *Answ.* 144 *of each Sort.*

Of DRY-MEASURE.

1. In 40 Quarters of Wheat, how many Bushels and Pecks? *Answ.* 320 *Bush.* 1280 *Pecks.*

2. Reduce 1280 Pecks of Wheat into Quarters. *Facit* 40 *qrs.*

3. In 30 Chaldron of Coals, each 36 Bushels, how many Pecks? *Answ.* 4320 *Pecks.*

4. Reduce 7094 Pecks of Coals into Chaldrons. *Facit* 49 *chal.* 9 *bush.* 2 *pecks.*

Of TIME.

1. In 121812 Seconds, how many Hours? *Answ.* 33 *Hours,* 50 *Min.* 12 *Sec.*

2. Reduce 41 Weeks into Days, Hours and Minutes. *Facit* 287 *Days,* 6888 *Hrs.* 413280 *Min.*

3 Reduce 413280 Minutes into Weeks. *Facit* 41 *Weeks.*

4. How many Seconds in a Year, allowing it to be 365 Days, 6 Hours? *Answ.* 31557600 *Seconds.*

5. How many Days have passed since the Birth of Christ, to Christmas, 1760? *Answ.* 642840 *Days.*

6. From *March* 2 to *November* 19 following (inclusive) how many Days *Answ.* 263 *Days.*

Of MOTION.

1. In half a Year's Time the Sun makes his Progress through 6 Signs of the Zodiac, how many Degrees, Minutes, and Seconds doth that amount to? *Answ.* 180 *Degrees*, 10800 *Min.* 648000 *Sec.*

Of the SINGLE RULE *of* THREE.

Q. HOW *many Parts are there in the Rule of* Three.

A. Two: *Single* or *Simple*, and *Double* or *Compound.*

Q. *By what is the* Single Rule *of* Three *known?*

A. By *three Terms*, which are always given in the Question to find a *Fourth.*

Q. *Are any of the* Terms *given to be reduced from one* Denomination to another?

A. If any of the given Terms be of several *Denominations*, they must be reduced into the lowest *Denomination* mentioned.

Q. *What do you observe concerning the* first *and* third Terms?

A. They must be of the same Name and Kind.

Q. *What do you observe concerning the* fourth Term?

A. It must be of the same Name and Kind with the *Second.*

Q. *What do you observe of the three given* Terms *taken together?*

A. That the two first are a *Supposition*, the last is a *Demand.*

Q. *How is the third* Third Term *known?*

A. It is known by these, or the like Words, *What Cost? How many? How much?*

Q. *How many Sorts of* Proportion *are there?*

A. Two: *Direct* and *Inverse.*

1. *Of* DIRECT PROPORTION.

Q. *What is* Direct Proportion?

A. Direct Proportion is when *more* requires *more*, or *less* requires *less.*

Q. *What do you mean by* more requires more?

A. More requires more is when the third Term is *greater* than the first; and therefore requires the fourth Term to be *greater* than the second in the same Proportion.

Q. *What do you mean by* less requires less?

A. Less requires less is when the third Term is less than the first; and therefore requires the fourth Term to be *less* than the second in the like Proportion.

Q. *How is the fourth* Term *in* Direct Proportion *found?*

A. By

A. By multiplying the second and third Terms together and dividing that Product by the first Term.

Q. *What Proportion does the fourth Number bear to any other?*

A. It bears the same Proportion to the Second, as the Third does to the First.

Q. *How do you prove Questions in the* Rule *of* Three Direct?

A. By changing their Order.

EXAMPLES.

1. If 3 *Oz.* of Silver cost 17*s.* what will 48 *Oz.* cost? *Answ.* 13*l.* 12*s.*

```
Oz.  s.     Oz.
 3 : 17 : : 48
            17
            ----
            2|0 l. s.
        3)816(27|2(13 12
```

2. If 3*lb.* of Ginger cost 3*s.* what cost 26*lb.*? *Answ.* 1*l.* 6*s.*

3. If 2 *oz.* of Silk cost 2*s.* 6*d.* what cost 7*lb.*? *Answ.* 7*l.*

4. If 1 Gallon of Ale cost 8*d.* what cost 36 Gallons? *Answ.* 1*l.* 4*s.*

5. If 1*lb.* of Sugar cost 4*d.* $\frac{1}{2}$ what cost 48*lb.*? *Answ.* 18*s.*

6. If 1*lb.* of Sugar cost 4*d.* what cost 1*C.*? *Answ.* 1*l.* 17*s.* 4*d.*

7. If an *C.* of Sugar cost 2*l.* 12*s.* what cost 1*lb.*? *Answ.* 5*d.* 2*qrs.* $\frac{32}{112}$.

8. If 1 Gallon of Beer cost 4*d.* what cost a Barrel? *Ans.* 12*s.*

9. If 1 Pair of Stockings cost 2*s.* 3*d.* what cost 19 Dozen Pair? *Answ.* 25*l.* 13*s.*

10. If 19 Dozen Pair of Shoes cost 25*l.* 13*s.* what cost 1 Pair? *Answ.* 2*s.* 3*d.*

11. Bought a Firkin of Butter, containing 56*lb.* for 18*s.* 8*d.* what is that *per lb.* *Ans.* 4*d.*

12. Sold 3 *C.* Weight of Tobacco, at 18*d.* *per lb.* what is the Price of the Whole? *Answ.* 25*l.* 4*s.*

13. Bought 19 Chaldron of Coals, at 29*s.* 6*d.* *per* Chaldron, what come they to? *Answ.* 28*l.* 0*s.* 6*d.*

14. If 1*lb.* of Sugar cost 9*d.* what cost 17 *C.* 2*qrs.*? *Answ.* 73*l.* 10*s.*

15. If 1 *oz.* of Silver cost 5*s.* 6*d.* what is the Price of a Tankard that weighs 1*lb.* 10*oz.* 10*dwts.* 4*gr.*? *Answ.* 6*l.* 3*s.* 9*d.* 2 *qrs.* $\frac{96}{480}$.

16. If 1*lb.* of Tobacco cost 15*d.* what cost 3 *hhds.* weighing together 15*C.* 1*qr.* 19*lb.*? *Answ.* 107*l.* 18*s.* 9*d.*

17. If a Yard of Cloth is worth 14*s.* what is the Worth of 5 Pieces, each 19 Yards? *Answ.* 66*l.* 10*s.*

18. If an Ell of Holland cost 4*s.* 6*d.* what is the Value of 5 Pieces, each 12 Ells? *Answ.* 13*l.* 10*s.*

19. If

19. If a Bushel of Coals cost 10*d.* how many Chaldron for 100*l?* *Ans.* 66 *Ch.* 24 *Bush.*

20. How many Quarters of Corn for 40 Guineas, at 4*s.* *per.* Bushel? *Ans.* 26 *Qrs.* 2 *Bush.*

21. If a Man's yearly Income be 300*l.* what is it *per* Day? *Ans.* 16*s.* 5*d.* 1*qr.* $\frac{15}{365}$.

22. If a man spend 7 *Pence per* Day, how much is that in a Year? *Ans.* 10*l.* 12*s.* 11*d.*

23. If a Pint of Wine cost 10*d.* what cost 3 *hhds?* *Ans.* 63*l.*

24. If a Pipe of Canary cost 40*l.* how much is that *per* Pint? *Ans.* 9*d.* 2*qrs.* $\frac{96}{1008}$.

25. Bought 12 Pieces of Cloth, each 12 Yards, at 10*s.* 6*d.* *per* Yard, what come they to? *Ans.* 75*l.* 12*s.*

26. What cost 120 Yards of Cloth, at 3*s.* *per* Yard? *Ans.* 18*l.*

27. A Merchant bought 4 Pieces of Holland, each 12 Ells for 7*l.* 10*s.* what did 1 Ell cost? *Ans.* 3*s.* 1*d.* $\frac{1}{2}$.

28. A Grocer bought 3 *Hhds.* of Sugar, each 10 *C.* 3 *qrs.* 12*lb.* Gross. Tare 26*lb.* *per Hhd.* at 2*d.* $\frac{1}{2}$ *per lb.* I demand what the 3 *Hhds.* came to? *Ans.* 37*l.* 3*s.* 9*d.*

29. How much must I pay for the Carriage of 10 *C.* $\frac{1}{2}$ at the Rate of 1*d.* $\frac{1}{2}$ *per lb.* *Ans.* 7*l.* 7*s.*

30. If 6 Horses eat up 21 Bushels of Oats in a Week's Time, how many Bushels will serve 20 Horses the same Time? *Ans.* 70 *Bush.*

31. If a Family of 10 Persons spend 3 Bushels of Malt in a Month, how many Bushels will serve them when they are 30 in Family? *Ans.* 9 *Bush.*

32. If an Ingot of Silver weighs 36 *oz.* 10 *dwts.* what is it worth at 5*s.* *per oz?* *Ans.* 9*l.* 2*s.* 6*d.*

33. How many Yards of Lace for 100*l.* at 3*s.* 6*d.* *per* Yard? *Ans.* 571 *Yds.* $\frac{18}{42}$.

34. If a Merchant hath owing to him 1000*l.* and his Debtor doth agree to pay him for every Pound 12*s.* 6*d.* I demand how much he must pay in all? *Ans.* 625*l.*

35. A Goldsmith sold a Tankard for 10*l.* 12*s.* at the Rate of 5*s.* 4*d.* *per oz.* I demand the Weight of it? *Ans.* 39 *oz.* 15 *dwts.*

36. A Man bought a Piece of Cloth for 16*l.* 10*s.* at 15*s.* *per* Yard, how many Yards did it contain? *Ans.* 22 *Yds.*

37. If 1 *C.* Weight of Cheese cost 37*s.* 4*d.* what is that *per lb?* *Ans.* 4*d.*

38. Coals at 33*s.* *per* Chaldron, how much per Bushel? *Ans.* 11*d.*

39. Wha

39. What cost 49392 Case Knives, at 4*s.* 4*d.* per Dozen? *Ans.* 891*l.* 16*s.*

40. If a Gentleman has an Estate of 245*l.* 10*s.* a Year, how much may he spend one Day with another, to lay up 60 Guineas at the Year's End? *Ans.* 10*s.* per Day.

41. If 17 *C.* 3 *qrs.* 14*lb.* of Tobacco, cost 133*l.* 13*s.* 4*d.* what cost 10*oz.* *Ans.* 1*d.*

42. If 1*C.* Weight of Lead, cost 15*s.* 11*d.* what cost 5 Fother? *Ans.* 77*l.* 11*s.* 10*d.*$\frac{1}{2}$

43. When the Tun of Wine cost 42*l.* what cost 1 Quart? *Ans.* 10*d.*

44. At a Noble per Week, how many Months Board may I have for 50*l.* *Ans.* 37 *Months.* 2 *Weeks.*

45. What cost a Pack of Wool, weighing 2*C.* 1*qr.* 19*lb.* at 8*s.* 6*d.* per Stone? *Ans.* 8*l.* 4*s.* 6*d.* 1*qr.* $\frac{10}{14}$.

46. What is Cheese per *C.* Weight, at 3*d.* $\frac{1}{2}$ per *lb?* *Ans.* 1*l.* 12*s.* 8*d.*

47. If a Yard of Cambric cost 12*s.* what cost 4 Pieces, each 20 Yards? *Ans.* 48*l.*

48. If a Yard of Broad Cloth cost 18*s.* what cost 5 Pieces, each 20 Yards? *Ans.* 90*l.*

49. If Lead be sold for 1*d.* $\frac{1}{2}$ per *lb.* what is 3*C.* Weight worth? *Ans.* 2*l.* 2*s.*

50. If Coffee be sold for 8*d.* $\frac{1}{4}$ per *oz.* what is 6*C.* Weight worth? *Ans.* 369*l.* 12*s.*

Of INVERSE PROPORTION.

Q. *What is* Inverse Proportion?

A. Inverse Proportion is when *more* requires *less*, or *less* requires *more.*

Q. *What is meant by* more requires less?

A. More requires *less* is when the third Term is *greater* than the first, and requires the fourth Term to be *less* than the second.

Q. *What is meant by* less requires more?

A. Less requires *more*, is when the third Term is *less* than the first, and requires the fourth Term to be *greater* than the second.

Q. *How is the fourth Term in* Inverse Proportion *found?*

A. By multiplying the first and second Terms together, and dividing that product by the *third* Term.

Q. *What* Proportion *does the* fourth Term *bear to any of the rest?*

A. It bears such Proportion to the *Second*, as the *First* does to the *Third.*

EXAM-

EXAMPLES.

1. If 48 Men can build a Wall in 24 Days, how many Men, can do the same in 192 Days? *Ans.* 6 *Men.*

2. If I lent my Friend 100*l.* for 6 Months (allowing the Months to be 30 Days) how long ought he to lend me 1000*l.* to requite my Kindness? *Ans.* 18 *Days.*

3. If 100*l.* in 12 Months gain 6*l.* Interest, what Principal will gain the same in 8 Months? *Ans.* 150*l.*

4. If a Footman performs a Journey in 3 Days, when the Days are 16 Hours long, how many Days will he require of 12 Hours long, to go the same Journey in? *Ans.* 4 Days.

5. How many Yards of Matting, that is half Yard wide, will cover a Room that is 18 Feet wide, and 30 Feet long? *Ans.* 120 *Yards.*

6. If 28*s.* will pay for the Carriage of an *C.* Weight 150 Miles, how far may 6 *C.* Weight be carried for the same Money? *Ans.* 25 *Miles.*

7. How much in length, that is 3 Inches broad, will make a Foot square? *Ans.* 48 *Inches.*

8. If 15 Shillings worth of Wine will serve 46 Men, when the Tun is worth 12*l.* how many Men will the same 15 Shillings worth suffice when, the Tun is worth but 8*l.* *Ans.* 69 *Men.*

9. If when the Price of a Bushel of Wheat is 6*s.* 3*d.* the Penny-Loaf will weigh 9*oz.* what must the Penny loaf weigh, when Wheat is 4*s.* 6*d.* the Bushel? *Ans.* 12*oz.* 10*dwts.*

10. Suppose 800 Soldiers were placed in a Garrison, and their Provisions were computed sufficient for 2 Months; how many Soldiers must depart, that the Provisions may serve them 5 Months? *Ans.* 480 *Men.*

11. There is a Cistern, having a Cock, which will empty it in 12 Hours; I demand how many Cocks of the same Capacity there must be to empty it in a Quarter of an Hour? *Ans.* 48 *Cocks.*

12. There was a certain building raised in 8 Months by 120 Workmen, but the same being demolished, it is required to be rebuilt in 2 Months; I demand how many Men must be employed about it? *Ans.* 480 *Men.*

13. A Piece of Tapestry is 3 Ells Flemish wide, and 4 Ell Flemish long, and it is required to be lined with something that is but 3 Quarters of a Yard wide; I demand haw many Yard there must be to compleat the Lining? *Ans.* 9 *Yards.*

O

Of PRACTICE.

Q. WHAT *is* Practice?

A. It is a short Way of finding the Value of any Quantity of Goods, by the given Price of one Integer.

Q. *How do you prove Questions in* Practice?

A. By the Single Rule of Three Direct: Or *Practice* may be proved by itself, by varying the Parts.

The TABLES.

s.	d.	l.	s.	d.	l.	s.	d.	C.wt.	lb.
$\frac{1}{2}$ is	6	$\frac{1}{2}$ is	10	0	$\frac{1}{15}$	1	4	$\frac{1}{2}$ is	56
$\frac{1}{3}$	4	$\frac{1}{3}$	6	8	$\frac{1}{16}$	1	3	$\frac{1}{4}$	28
$\frac{1}{4}$	3	$\frac{1}{4}$	5	0	$\frac{1}{20}$	1	0	$\frac{1}{7}$	16
$\frac{1}{6}$	2	$\frac{1}{5}$	4	0	$\frac{1}{30}$	0	8	$\frac{1}{8}$	14
$\frac{1}{8}$	1 $\frac{1}{2}$	$\frac{1}{6}$	3	4	$\frac{1}{40}$	0	6	$\frac{1}{14}$	8
$\frac{1}{12}$	1	$\frac{1}{8}$	2	6	$\frac{1}{60}$	0	4	$\frac{1}{16}$	7
		$\frac{1}{10}$	2	0	$\frac{1}{80}$	0	3		
		$\frac{1}{12}$	1	8	$\frac{1}{120}$	0	2		

CASE I.

Q. *What must be done with the Price of an* Integer, *when it is less than a Penny?*

A. Find the aliquot Parts of that Price contained in a *Penny*, which must be *Divisors* to the given Sum; that is, if the *Price* be a Farthing, say a Farthing is the fourth of a Penny, and set it thus, | $\frac{1}{4}$ | $\frac{1}{4}$ |. If the Price be a Half-penny, then say, a Half-penny is the half, thus, | $\frac{1}{2}$ | $\frac{1}{2}$ |. If it is three Farthings then say, a Halfpenny is the half of a Penny, and a Farthing is the fourth of a Penny, thus, | $\frac{1}{2}$ | $\frac{1}{2}$ | / | $\frac{1}{4}$ | $\frac{1}{4}$ |

Q. *What do you observe concerning these Columns?*

A. The first Column contains the *Money* and the other the *Parts*.

Note 1. When there are more *aliquot Parts* than one, their *Quotients* must be added together, and the *Sum*, if the first *aliquot Part* be taken from a *Penny*, will be *Pence*; if it be taken from a *Shilling*, will be *Shillings*; or if it be taken from a *Pound* will be *Pounds*.

2. It is frequently better to take *Parts* of *Parts*, than *Parts* of the whole *Price*; and then the *three Farthings* above-mentioned may as well be taken thus, | $\frac{1}{2}$ | $\frac{1}{2}$ | / | $\frac{1}{4}$ | $\frac{1}{2}$ | this a *Halfpenny* is the *half* of a *Penny*, and a *Farthing* is the *half* of a *Halfpenny*.

EXAMPLES.

$\frac{1}{4}$	$\frac{1}{4}$	7 6 1 2 *at* $\frac{1}{4}$.	1280 *at* $\frac{1}{4}$.
	12	1 9 0 3	*Facit* 1*l.* 6*s.* 8*d.*
	2|0	1 5 8	
		7*l.* 18*s.* 7*d.*	
$\frac{1}{2}$	$\frac{1}{2}$	6 8 1 2 *at* $\frac{1}{2}$.	7672 at $\frac{1}{2}$.
	12	3 4 0 6	*Facit* 15*l.* 19*s.* 8*d.*
	2|0	2 8|3 10	
		14*l.* 3*s.* 10*d.*	
$\frac{1}{2}$	$\frac{1}{2}$	4 7 1 2 *at* $\frac{3}{4}$.	9180 *at* $\frac{3}{4}$.
$\frac{1}{4}$	$\frac{1}{2}$	2 3 5 6	*Facit* 28*l.* 13*s.* 9*d.*
		1 1 7 8	
	12	3 5 3 4	
	2|0	2 9|4 6	
		1 4*l.* 14*s.* 6*d.*	

CASE 2.

Q. *What must be done with the Price of an* Integer *when it is less than a* Shilling?

A. Find the aliquot Parts of that Price contained in a *Shilling*, which must be Divisors to the given Sum. Or thus,

If the given *Price* be not the aliquot Part of a *Shilling*, then first take some Part of it that is an aliquot Part; and for the remaining Part of the *Price*, let it be taken out of the foregoing Part or Parts, and then add the Quotients together as before, the Total will be the Answer in *Shillings*.

EXAMPLES.

1	$\frac{1}{12}$	7 6 1 2 *at* 1*d.*	6812 *at* 1*d.*
	2|0	6 3|4 4	*Facit* 28*l.* 7*s.* 8*d.*
		3 1*l.* 14*s.* 4*d.*	
1	$\frac{1}{12}$	8 6 1 2 *at* 1*d.* $\frac{1}{4}$.	1861 *at* 1*d.* $\frac{1}{4}$.
$\frac{1}{4}$	$\frac{1}{4}$	7 1 7 8	*Facit* 9*l.* 13*s.* 10*d.* $\frac{1}{4}$.
		1 7 9 5	
	2|0	8 9|7 1	4121 *at* 1*d.* $\frac{1}{2}$.
		4 4*l.* 17*s.* 1*d.*	*Facit* 25*l.* 15*s.* 1*d.* $\frac{1}{2}$.

1861 *at* 1*d.* $\frac{3}{4}$.

Facit 13*l.* 11*s.* 4*d.* $\frac{3}{4}$.

4761 *at* 2*d.*

Facit 39*l.* 13*s.* 6*d.*

6181 *at* 2*d.* $\frac{1}{4}$.

Facit 57*l.* 18*s.* 11*d.* $\frac{1}{4}$.

1218 *at* 2*d.* $\frac{1}{2}$.

Facit 12*l.* 13*s.* 9*d.*

8012 *at* 2*d.* $\frac{3}{4}$.

Facit 91*l.* 16*s.* 1*d.*

7612 *at* 3*d.*

Facit 95*l.* 3*s.*

6128 *at* 3*d.* $\frac{1}{4}$.

Facit 82*l.* 19*s.* 8*d.*

6180 *at* 3*d.* $\frac{1}{2}$

Facit 90*l.* 2*s.* 6*d.*

7812 *at* 3*d.* $\frac{3}{4}$.

Facit 122*l.* 1*s.* 3*d.*

8120 *at* 4*d.*

Facit 135*l.* 6*s.* 8*d.*

7000 *at* 4*d.* $\frac{1}{4}$.

123*l.* 19*s.* 2*d.*

6001 at 4*d.* $\frac{1}{2}$.

Facit 112*l.* 10*s.* 4*d.* $\frac{1}{2}$.

7121 *at* 4*d.* $\frac{3}{4}$

Facit 140*l.* 18*s.* 8*d.* $\frac{3}{4}$.

7181 *at* 5*d.*

Facit 149*l.* 12*s.* 1*d.*

8121 *at* 5*d.* $\frac{1}{4}$.

Facit 177*l.* 12*s.* 11*d.* $\frac{1}{4}$.

6128 *at* 5*d.* $\frac{1}{2}$.

Facit 140*l.* 8*s.* 8*d.*

6100 *at* 5*d.* $\frac{3}{4}$.

Facit 146*l.* 2*s.* 11*d.*

1000 *at* 6*d.*

Facit 25*l.*

7610 *at* 6*d.* $\frac{1}{4}$.

Facit 198*l.* 3*s.* 6*d.* $\frac{1}{2}$.

1218 *at* 6*d.* $\frac{1}{2}$.

Facit 32*l.* 19*s.* 9*d.*

6000 *at* 6*d.* $\frac{3}{4}$.

Facit 168*l.* 15*s.*

7101 *at* 7*d.*

Facit 207*l.* 2*s.* 3*d.*

1001 *at* 7*d.* $\frac{1}{4}$.

Facit 30*l.* 4*s.* 9*d.* $\frac{1}{4}$.

4100 *at* 7 $\frac{1}{2}$.

Facit 128*l.* 2*s.* 6*d.*

6120 *at* 7*d.* $\frac{3}{4}$.

Facit 197*l.* 12*s.* 6*d.*

7100 *at* 8*d.*

Facit 236*l.* 13*s.* 4*d.*

6100 *at* 8*d.* $\frac{1}{4}$.

Facit 209*l.* 13*s.* 9*d.*

8000 *at* 8*d.* $\frac{1}{2}$.

Facit 283*l.* 6*s.* 8*d.*

6000 *at* 8*d.* $\frac{3}{4}$.

Facit 218*l.* 15*s.*

9000 *at* 9*d.*

Facit 337*l.* 10*s.*

4121 *at* 9*d.* $\frac{1}{4}$.

Facit 158*l.* 16*s.* 7*d.* $\frac{1}{4}$.

6100 *at* 9*d.* $\frac{1}{4}$.

Facit 241*l.* 9*s.* 2*d.*

5918 *at* 9*d.* $\frac{3}{4}$.

Facit 240*l.* 8*s.* 4*d.* $\frac{1}{2}$.

8121 *at* 10*d.* *

Facit 338*l.* 7*s.* 6*d.*

6712 *at* 10*d.* $\frac{1}{4}$.

Facit 286*l.* 13*s.* 2*d.*

1002 *at* 10*d.* $\frac{1}{2}$.

Facit 43*l.* 16*s.* 9*d.*

4680 *at* 10*d.* $\frac{3}{4}$.

Facit 209*l.* 12*s.* 6*d.*

1260 *at* 11*d.*

Facit 57*l.* 15*s.*

6121 *at* 11*d.* $\frac{1}{4}$.

Facit 286*l.* 18*s.* 5*d.* $\frac{1}{4}$.

1234 *at* 11*d.* $\frac{1}{2}$.

Facit 59*l.* 2*s.* 7*d.*

2345 *at* 11*d.* $\frac{3}{4}$.

Facit 114*l.* 16*s.* 1*d.* $\frac{3}{4}$.

100 *at* 11*d.* $\frac{3}{4}$.

Facit 4*l.* 17*s.* 11*d.*

* *Note.* When the Price of an *Integer* is 10*d.* annex a Cypher to the given Number, and divide by 12 and by 20.

CASE

CASE 3.

[illegible] one with the Price of an Integer, *when it is* [illegible] *ling, but less than two* Shillings?

[illegible] *art* or *Parts* be taken only with so much of the given *Price* [illegible] more than one *Shilling;* that is, if the *Price* [illegible] *d.* ½, take the Parts only with 2*d.* ½, and let the given Quantity stand for *Shillings,* which must be added with the rest; and the Total will be the Answer in *Shillings.*

EXAMPLES.

¼	¼	4 8 6 *at* 12*d.* ¼.	1281 at 13*d.* ¼.
	12	1 2 1 ½.	*Facit* 70*l.* 14*s.* 5*d.* ¼.
		1 0 1 ½.	
	2|0	4 9|6 1 ½.	6100 *at* 13*d.* ½.
		2 4*l.* 16*s.* 1*d.* ½.	*Facit* 343*l.* 2*s.* 6*d.*
½	½	4 8 6 *at* 12*d.* ½.	1210 *at* 3*d.* ¾.
	12	2 4 3	*Facit* 69*l.* 6*s.* 5*d.* ½.
		2 0 3	
	2|0	5 0|6 3	1210 *at* 14*d.*
		2 5*l.* 6*s.* 3*d.*	*Facit* 70*l.* 11*s.* 8*d.*
		7612 *at* 12*d.* ¼.	1271 *at* 14*d.* ¼.
		Facit 388*l.* 10*s.* 7*d.*	*Facit* 75*l.* 9*s.* 3*d.* ¾.
		1216 *at* 12*d.* ½.	6120 *at* 14*d.* ½.
		Facit 63*l.* 6*s.* 8*d.*	*Facit* 369*l.* 15*s.*
		1216 *at* 12*d.* ¾.	1210 *at* 14*d.* ¾.
		Facit 64*l.* 12*s.*	*Facit* 74*l.* 7*s.* 3*d.* ½.
		6121 *at* 13*d.*	1260 *at* 15*d.*
		Facit 331*l.* 11*s.* 1*d.*	*Facit* 78*l.* 15*s.*

1612 *at* 15*d.* ¼.

Facit 102*l.* 8*s.* 7*d.*

1210 *at* 15*d.* ½.

Facit 78*l.* 2*s.* 11*d.*

7612 *at* 15*d.* ¾.

Facit 499*l.* 10*s.* 9*d.*

6100 *at* 16*d.*

Facit 406*l.* 13*s.* 4*d.*

7121 *at* 16*d.* ¼.

Facit 482*l.* 3*s.* 0*d.* ¼.

1218 *at* 16*d.* ½.

Facit 83*l.* 14*s.* 9*d.*

8100 *at* 16*d.* ¾.

Facit 565*l.* 6*s.* 3*d.*

4128 *at* 17*d.*

Facit 292*l.* 8*s.*

1230 *at* 17*d.* ¼.

Facit 88*l.* 8*s.* 1*d.* ½.

2340 *at* 17*d.* ½.

Facit 170*l.* 12*s.* 6*d.*

3450 *at* 17*d.* ¾.

Facit 255*l.* 3*s.* 1*d.* ½.

4560 *at* 18*d.*

Facit 342*l.*

5670 *at* 18*d.* ¼.

Facit 431*l.* 3*s.* 1*d.* ½.

6789 *at* 18*d.* ½.

Facit 523*l.* 6*s.* 4*d.* ½.

7890 *at* 18*d.* ¾.

Facit 616*l.* 8*s.* 1*d.* ½.

8900 *at* 19*d.*

Facit 704*l.* 11*s.* 8*d.*

9000 *at* 19*d.* ¼.

Facit 721*l.* 17*s.* 6*d.*

9876 *at* 19*d.* ½.

Facit 802*l.* 8*s.* 6*d.*

8765 *at* 19*d.* ¾.

Facit 721*l.* 5*s.* 8*d.* ¾.

7120 *at* 20*d.* ¼.

Facit 600*l.* 15*s.*

6543 *at* 20*d.* ½.

Facit 558*l.* 17*s.* 7*d.* ½.

5432 *at* 20*d.* ¾.

Facit 469*l.* 12*s.* 10*d.*

4321 *at* 21*d.*	6700 *at* 22*d.* $\frac{1}{2}$.
Facit 378*l.* 1*s.* 9*d.*	*Facit* 628*l.* 2*s.* 6*d.*
3210 *at* 21*d.* $\frac{1}{4}$.	6812 *at* 22*d.* $\frac{3}{4}$.
Facit 284*l.* 4*s.* 4*d.* $\frac{1}{2}$.	*Facit* 645*l.* 14*s.* 5*d.*
2100 *at* 21*d.* $\frac{1}{2}$.	1210 *at* 23*d.*
Facit 188*l.* 2*s.* 6*d.*	*Facit* 115*l.* 19*s.* 2*d.*
1000 *at* 21*d.* $\frac{3}{4}$.	1800 *at* 23*d.* $\frac{1}{4}$.
Facit 90*l.* 12*s.* 6*d.*	*Facit* 174*l.* 7*s.* 6*d.*
1090 *at* 22*d.* *	6760 *at* 23*d.* $\frac{1}{2}$.
Facit 99*l.* 18*s.* 4*d.*	*Facit* 661*l.* 18*s.* 4*d.*
9010 *at* 22*d.* $\frac{1}{4}$.	9990 *at* 23*d.* $\frac{3}{4}$.
Facit 835*l.* 6*s.* 0*d.* $\frac{1}{2}$.	*Facit* 988*l.* 11*s.* 10*d.* $\frac{1}{2}$.

* *Note.* When the Price of an *Integer* is 22*d.* annex a *Cipher* to the given Number, and divide by 12 (as at 10*d*) then add both Lines together; the Sum will be the *Total* in *Shillings*.

CASE 4.

Q. *What must be done with the Price of an* Integer, *when it is any even Number of* Shillings *under* 20*s.* *as* 6*s.* 8*s.* &c.?

A. Multiply the given Quantity by half of the *Price*, and double the first Figure of the Product for *Shillings*, and the rest of the *Product* will be *Pounds*.

Note. This *Rule* is taken from an Operation in *Decimals*.

EXAMPLES.

486 *at* 2*s.*	7612 *at* 2*s.*
1	*Facit* 761*l.* 4*s.*
48*l.* 12*s.*	
769 *at* 4*s.*	
2	1286 *at* 4*s.*
153*l.* 16*s.*	*Facit* 257*l.* 4*s.*

7618

7618 *at* 6*s.*	171 *at* 14*s.*
Facit 2285*l.* 8*s.*	*Facit* 119*l.* 14*s.*
191 *at* 8*s.*	171 *at* 16*s.*
Facit 76*l.* 8*s.*	*Facit* 136*l.* 16*s.*
180 *at* 10*s.* *	712 *at* 18*s.*
Facit 90*l.*	*Facit* 640*l.* 16*s.*

* *Note.* When the Price of an *Integer* is 10*s*, you may take half of the given *Integers*, and it is done: and the *Remainder*, (if there be any) will be 10*s*.

CASE 5.

Q. *What must be done with the Price of an* Integer, *when it is any odd Number of* Shillings *under* 20, *as* 3*s.* 5*s.* &c.

A. Multiply the given *Integers* by the *Price*, and that Product divide by 20, the Quotient will be the *Answer*.

EXAMPLES.

121 *at* 1*s.*	121 *at* 11*s.*
Facit 6*l.* 1*s.*	*Facit* 66*l.* 11*s.*
121 *at* 3*s.*	600 *at* 13*s.*
Facit 18*l.* 3*s.*	*Facit* 390*l.*
471 *at* 5*s.* †	190 *at* 15*s.*
Facit 117*l.* 15*s.*	*Facit* 142*l.* 10*s.*
860 *at* 7*s.*	121 *at* 17*s.*
Facit 301*l.*	*Facit* 102*l.* 17*s.*
612 *at* 9*s.*	100 *at* 19*s.*
Facit 275*l.* 8*s.*	*Facit* 95*l.*

† *Note.* When the Price of an *Integer* is 5*s.* the Work may be done at once, because 5*s.* is the *fourth Part* of a Pound.

CASE

CASE 6.

Q. *What must be done with the Price of an* Integer, *when it is* Shillings *and* Pence?

A. 1. If the *Shillings* and *Pence* be the *aliquot* Part of a *Pound*, it may be done at once, as 6*s.* 8*d.* is the third of a *Pound.*

EXAMPLES.

12 *at* 6*s.* 8*d.*	21 *at* 2*s.* 6*d.*
Facit 4*l.*	*Facit* 2*l.* 12*s.* 6*d.*
69 *at* 3*s.* 4*d.*	96 *at* 1*s.* 8*d.*
Facit 11*l.* 10*s.*	*Facit* 8*l.*

2. If the *Shillings* and *Pence* be not the *aliquot* Part of a *Pound*, or if there be *Shillings*, *Pence*, and *Farthings*, multiply the given Quantity by the *Shillings*, and take Parts with the rest and add them together; the Sum will be the Answer in *Shillings.*

EXAMPLES.

3	$\frac{1}{4}$	126 *at* 9*s.* 3*d.*	70 *at* 7*s.* 4*d.* $\frac{3}{4}$.
		9	*Facit* 25*l.* 17*s.* 8*d.* $\frac{1}{2}$.
		1134	
		31 6	
	2|0	116|5 6	55 *at* 4*s.* 8*d.* $\frac{1}{2}$.
		58*l.* 5*s.* 6*d.*	*Facit* 12*l.* 18*s.* 11*d.* $\frac{1}{2}$.
		86 *at* 6*s.* 10*d.*	77 *at* 10*s.* 6*d.* $\frac{1}{4}$.
		Facit 29*l.* 7*s.* 8*d.*	*Facit* 40*l.* 10*s.* 1*d.* $\frac{1}{2}$.
		10 *at* 12*s.* 4*d.*	12 *at* 13*s.* 10*d* $\frac{1}{2}$.
		Facit 6*l.* 3*s.* 4*d.*	*Facit* 8*l.* 6*s.* 6*d.*
		30 *at* 4*s.* 9*d.*	17 at 17*s.* 4*d.* $\frac{1}{4}$.
		Facit 7*l.* 2*s.* 6*d.*	*Facit* 14*l.* 15*s.* 0*d.* $\frac{1}{4}$.
		73 *at* 7*s.* 6*d.*	46 *at* 7*s.* 3*d.* $\frac{3}{4}$.
		Facit 27*l.* 7*s.* 6*d.*	*Facit* 16*l.* 16*s.* 4*d.* $\frac{1}{2}$.

CASE

CASE 7.

Q. *What must be done with the Price of an* Integer, *when it is* Pounds *only?*

A. Multiply the given *Integers* by the *Price*, the Product will be the *Answer.*

EXAMPLES.

72 *at* 5*l.*	19 *at* 4*l.*
Facit 360*l.*	*Facit* 76*l.*
64 *at* 3*l.*	46 *at* 7*l.*
Facit 192*l.*	*Facit* 322*l.*

CASE 8.

Q. *What must be done with the Price of an* Integer, *when it is* Pounds *and* Shillings?

A. Multiply the *Integers* given, by the *Pounds*; then proceed with *Shillings* if the are *even*, according to *Case* 4; but if they are *odd*, according to *Case* 5, and add them together; the Total will be the *Answer.*

EXAMPLES.

26 *at* 4*l.* 8*s.*	48 *at* 7*l.* 10*s.*
4	*Facit* 360*l.*
104	
10 8	26 *at* 11*l.* 14*s.*
114*l.* 8*s.*	*Facit* 304*l.* 4*s.*
49 *at* 3*l.* 7*s.*	
7	15 *at* 4*l.* 13*s.*
2|0 34|3	*Facit* 69*l.* 15*s.*
17 3	
147	17 *at* 9*l.* 15*s.*
164*l.* 3*s.*	*Facit* 165*l.* 15*s.*
36 *at* 5*l.* 13*s.*	16 *at* 3*l.* 6*s.*
Facit 203*l.* 8*s.*	*Facit* 52*l.* 16*s.*

CASE

CASE 9.

Q. *What must be done with the Price of an* Integer, *when it is* Pounds, Shillings, *and* Pence?

A. 1. If the *Shillings* and *Pence* be the aliquot Part of a *Pound*, multiply the given *Integers* by the *Pounds*, and divide by the *aliquot Part*. Those Numbers so found out, being added together, will be the Sum required.

EXAMPLES.

47 *at* 3*l.* 3*s.* 4*d.*	17 *at* 2*l.* 6*s.* 8*d.*
Facit 148*l.* 16*s.* 8*d.*	*Facit* 39*l.* 13*s.* 4*d.*
20 *at* 4*l.* 13*s.* 4*d.*	30 *at* 1*l.* 2*s.* 6*d.*
Facit 93*l.* 6*s.* 8*d.*	*Facit* 33*l.* 15*s.*

2. If the *Shillings* and *Pence* be not the aliquot Part of a *Pound*, or if there be *Shillings*, *Pence*, and *Farthings*, given with the *Pounds*, then reduce the *Pounds* and *Shillings* into *Shillings*, and multiply the given *Integers* by the said *Shillings*; next take Parts with the rest of the *Price*, and add them together as before.

EXAMPLES.

3 | 1 120 *at* 4*l.* 7*s.* 3*d.* $\frac{1}{2}$.	21 *at* 5*l.* 14*s.* 7*d.* $\frac{1}{4}$.
87 20	*Facit* 120*l.* 6*s.* 8*d.* $\frac{1}{4}$.
10440 87	
$\frac{1}{2}$ | $\frac{1}{0}$ 30	
5	70 *at* 1*l.* 14*s.* 7*d.*
2 | 0 1047 | 5	*Facit* 121*l.* 0*s.* 10*d.*
523*l.* 15*s.*	
14 *at* 2*l.* 10*s.* 6*d.*	46 *at* 3*l.* 19*s.* 8*d.* $\frac{1}{2}$.
acit 35*l.* 7*s.*	*Facit* 183*l.* 6*s.* 7*d.*

Q. *What other Ways hav eyou of answering* Questions *in this* Case?

A. 1. When the Number of *Integers* does not exceed 12, multiply the *Price* by the *Integers*, as in *Compound Multiplication*, the *Product* will be the *Answer*.

2. When the Number of *Integers* does exceed 12, multiply the *Price* by the *Parts* instead of the *Whole*. Or,

3. You

3. You may multiply the *Price* by the whole Number of *Integers*. Thus,

58361 *Hhds. of Tobacco, at* 48*l.* 12*s.* 9*d. per Hhd.*

48	12	9					*Memorandum.*				
		58361		1.		2.		3.		4.	
				s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
48	12	9		16	6						
2918	5	0		18	3	2	6				
14591	5	0		2	6						
389100	0	0		3	9	17	6	15	0	10	0
2431875	0	0									
2838533	2	9									

Q. *How is it wrought?*

A. Multiply by the several Figures in the *Multiplier*, as in *Compound Multiplication*, but with this Difference, that the *Products* of the *Shillings* and *Pence*, multiplied by the 6, 3, 8, and 5, must be placed by themselves in a *Memorandum*, and the *Products* of the *Pounds* by the same figures placed as in *Simple Multiplication*. Thus,

		l.	*s.*	*d.*		
		48	12	9		
			58361		*Memor.*	
1	*Product* - -	48	12	9	*s.*	*d.*
2	- - - - -	291			16	6
3	- - - - -	145			18	3
4	- - - -	389			2	6
5	- - - -	243			3	9

Then to fill up the *Blanks* in the *second Product*, take half of the 16*s.* in the *Memorandum*, which is 8, and set it in the *Units* Place of the *Pounds*. Annex a *Cipher* to the 6*d.* which makes 60*d.* or 5*s.* place this under the *Shillings*, and the Line is done with, there being no *Pence* remaining.

For the *Blanks* in the *third Product*, take half of the 18*s*, in the *Memorandum*, and put it in the *Tens* Place of the *Pounds*. Annex a *Cipher* to the 3*d.* which makes 30*d.* or 2*s.* 6*d.* this put in the *second Memorandum*. Then take half of the 2*s.* in this new *Memorandum*, and put it in the *Units* Place of the *Pounds*. Annex a *Cipher* to the 6*d.* in the new *Memorandum*, which makes 60*d.* or 5*s.* put this in the Place of *Shillings*, and this Line is finished, there being no *Pence* remaining.

For

For the *Blanks* in the *fourth Product*, take half of the 2*s.* in the first *Memorandum*, and put it in the *Hundreds* Place of the *Pounds;* and because there remains nothing, nor are there any *Pence* in the *Memorandum*, therefore fill up the other *Blanks* with *Ciphers*, and the Line is finished.

For the *Blanks* in the *fifth Product*, take half of the 3*s.* in the *first Memorandum*, and put it in the *Thousands* Place of the *Pounds;* then, because there is one remaining, put that in the *second Memorandum.* Annex a *Cipher* to the 9*d.* which makes 90*d.* or 7*s.* 6*d.* put this to the former 1, and it makes 17*s.* 6*d.* take half of the 17*s.* and put it in the *Hundreds* Place of the *Pounds;* then, because there is one remaining, put that in the *third Memorandum.* Annex a *Cipher* to the 6*d.* and it makes 60*d.* or 5*s.* put this to the 1 in the *third Memorandum*, and it makes 15*s.* take half of the 15*s.* and put it in the *Tens* Place of the *Pounds;* then, because there remains 1, put it in the *fourth Memorandum*, and since there are no *Pence* in the *third Memorandum* to put a *Cipher* to, let a *Cipher* be annexed to the 1 in the *last Memorandum*, which makes 10*s.* take half of this 10*s.* and put it in the *Units* Place of the *Pounds;* then, because there are no *Pence* in the *Memorandum*, neither is there any thing remaining of the 10, therefore fill up the other *Blanks* with *Ciphers*, and the Line is compleated: Add all together, and their *Sum* is the Total *Product* of the Whole.

	l.	*s.*	*d.*	*Memorandum.*		
7000 *Hhds. of Wine, at*	17	14	8 *per Hhd.*	1.	2.	3.
			7000	*s. d.*	*s. d.*	*s. d.*
				2 8	6 8	6 8
	124133	6	8			

Note 1, *To fill up the* Blanks *in the* Pounds *of the* Second, Third, *&c.* Products, *always take half of the* Shillings *in the* Memorandum; *and if* 1 *remains make a* new Memorandum *of it.*

2. Always annex a *Cipher* to the *Pence*, and whatever Number of *Shillings* they make, put them to the 1 in the *new Memorandum;* and so on till all the *Blanks* in the *Pounds* are filled up: If there be any *Pence* yet remaining in the *Memorandum*, put a *Cipher* to them, and what *Shillings* and *Pence* they make, let them be put in the *Shillings* and *Pence* Place in the *Product.*

3. All the *Examples* in this *Case*, and *Case* 8, may serve here instead of others.

CASE 10.

Q. *What must be done with the Price of an* Integer, *when both that and the* Quantity *given are of several Denominations?*

A. Multiply the *Price* by the *Integers*, and take Parts with the Parts of the *Integers.*

EXAMPLES.

C.	qrs.	lb.			l.	s.			l.	s.	d.
12	3	16	*of Tobacco,*	*at*	4	12	*per C. wt.*	*Facit*	59	6	$1\frac{1}{2}$ +
			$\frac{1}{2}$	$\frac{1}{2}$		12					
					55	4					
			$\frac{1}{4}$	$\frac{1}{2}$	2	6					
			16	$\frac{1}{7}$	1	3					
					0	13	$1\frac{1}{2}$ +				
					59	6	$1\frac{1}{2}$ +				

C.	qrs.	lb.			l.	s.	d.		l.	s.	d.
12	2	14	*of Tobacco,*	*at*	3	14	0 *per C.*	*Facit*	46	14	3
17	3	19	*of Sugar,*	*at*	2	2	6 *per C.*	*Facit*	38	1	$6\frac{3}{4}$
4	1	16	*of Soap,*	*at*	3	12	0 *per C.*	*Facit*	15	16	$3\frac{1}{2}$
10	0	12	*of Tallow*	*at*	1	19	6 *per C.*	*Facit*	19	19	$2\frac{1}{2}$
5	1	10	*of Tobacco,*	*at*	2	17	0 *per C.*	*Facit*	14	19	3
4	3	0	*of Sugar,*	*at*	2	18	6 *per C.*	*Facit*	13	17	$10\frac{1}{2}$
7	0	19	*of Sugar,*	*at*	3	16	0 *per C.*	*Facit*	27	4	$10\frac{1}{2}$
5	2	10	*of Tobacco,*	*at*	2	18	$6\frac{1}{2}$ *per C.*	*Facit*	16	7	$2\frac{1}{4}$
7	1	14	*of Tobacco,*	*at*	3	15	$9\frac{1}{4}$ *per C.*	*Facit*	27	18	$9\frac{1}{2}$
9	2	26	*of Tallow*	*at*	4	10	$4\frac{1}{2}$ *per C.*	*Facit*	43	19	6

Of INTEREST.

Q. HOW *many Kinds of* Interest *are there?*

A. Two: *Simple* and *Compound.*

Of Simple INTEREST.

Q. *What is* Simple Interest?

A. Simple Interest is the *Profit* allowed in the lending or forbearance of any Sum of Money, for some determined Space of Time.

Q. *What is the* Principal?

A. The *Principal* is any Sum of Money lent, for which *Interest* is to be received.

Q. *What is the* Rate per Cent.?

A. It is a certain *Sum* agreed on between the *Lender* and the *Borrower,* to be paid for every 100 *Pounds,* for the Use of the *Principal,* which, according to the Laws of *England,* ought not to be above 5*l.* for the Use of 100*l.* for 1 Year, and 10*l.* for the Use of 100*l.* for 2 Years; and so on for any Sum of *Money,* in Proportion to the *Time* proposed.

Q. *What*

Q. *What is the* Amount?

A. It is the *Principal* and *Interest* added together.

Q. *What other Things is* Interest *applicable to?*

A. It is applied to *Commission* or *Provision*, *Brokage*, *Storage*, and *Insurance*, which have no respect to *Time*.

CASE I.

Q. *How do you find the* Interest *of any given* Sum *for a* Year?

A. Multiply the *Principal* by the *Rate per Cent.* and divide that Product by 100, the Quotient is the *Interest* required.

Q. *How do you find the* Interest *of any given* Sum *for several* Years?

A. Multiply the *Interest* for one *Year* by the Number of *Years* given in the Question; the Product will be the *Answer*.

EXAMPLES.

1. If 100*l.* in one Year's Time yield 5*l.* Interest, what will 486*l.* yield in the same Time? *Answ.* 24*l.* 6*s.*

```
   l.
  486
    5
 ----
24|30
  |20
 6|00
```

2. What is the Interest of 220*l.* for a Year, at 4 per Cent. per Ann.? *Answ.* 8*l.* 16*s.*

3. What is the Interest of 76*l.* for two Years, at 5 per Cent. per Ann.? *Answ.* 7*l.* 12*s.*

4. What is the Amount of 400*l.* for 12 Years, at 6 per Cent. per Ann.? *Answ.* 688*l.*

Of Factors Allowances, *commonly called* Commission *or* Provision.

Q. *What is* Commission *or* Provision?

A. It is an Allowance from *Merchants* to their *Factors* or *Agents* beyond the Sea, in the buying or selling of any Sort of Goods; and is a certain *Rate per Cent.* according to the Custom of the Country where the *Factor* resides.

EXAMPLES.

5. My Factor sends me Word, that he has bought Goods to the Value of 500*l.* 13*s.* 6*d.* upon my Account; I demand what his Commission comes to at 3 $\frac{1}{2}$ per Cent? *Answ.* 17*l.* 10*s.* 5*d.* 2 *qrs.* $\frac{68}{100}$.

6. My

6. My Correspondent has disbursed upon my Account, the Sum of 1009*l.* 18*s.* what must he demand for his Commission, when I allow him 2 $\frac{1}{4}$ *per Cent?* *Answ.* 22*l.* 14*s.* 5*d.* 1 *qr.* $\frac{84}{100}$.

7. Suppose I allow my Correspondent 1 $\frac{3}{4}$ *per Cent.* for Provision; what may he demand on the Disbursement of 704*l.* 15*s.* 4*d.*? *Answ.* 12*l.* 6*s.* 8*d.* $\frac{2}{100}$.

CASE 2.

Q. *How do you find the* Interest *of any* Sum for $\frac{1}{4}$, $\frac{1}{2}$, *or* $\frac{3}{4}$ *of a* Year, *besides the Number of* Years *given in the* Question.

A. For $\frac{1}{4}$ of a Year take a *fourth* Part of the *Interest* for one Year; for $\frac{1}{2}$ of a Year, take *half* of the *Interest* for one Year; for $\frac{3}{4}$ of a Year take the Parts compounded of $\frac{3}{4}$ and add them to the *Interest* for the rest of the Time; the *Sum* will be the *Interest* required.

EXAMPLES.

1. What is the Interest of 200*l.* for 3 Years and $\frac{3}{4}$ at 5 *per Cent. per Annum?* *Answer* 37*l.* 10*s.*

200	$\frac{1}{2}$	$\frac{1}{2}$	10
5			3
10|00			30
	$\frac{1}{2}$	$\frac{1}{2}$	5
			2 10
			37 10

2. What is the Interest of 468*l.* 12*s.* 4*d.* for 1 Year and $\frac{3}{4}$, at 6 *per Cent. per Annum?* *Answ.* 49*l.* 4*s.* 1*d.*

3. What is the Interest of 112*l.* 10*s.* 4*d.* for 5 Years and $\frac{1}{2}$ at 6 *per Cent. per Annum?* *Answ.* 37*l.* 2*s.* 6*d.* +

4. What is the Interest of 468*l.* for 4 Years and $\frac{1}{4}$, at 6 *per Cent. per Annum?* *Answ.* 119*l.* 6*s.* 8*d.* $\frac{3}{4}$.

5. What is the Interest of 1000*l.* for 2 Years and $\frac{3}{4}$, at 4 *per Cent. per Annum?* *Answ.* 110*l.*

Of BROKAGE.

Q. *What is* Brokage?

A. It is an Allowance made to Persons called *Brokers*, at a certain *Rate per Cent.* for finding Customers, and selling to them the Goods of other Men, whether Strangers or Natives.

Q. *How do you find the* Brokage *of any* Sum?

A. Divide the given Sum by 100, and take Parts from the Quotient with the *Rate per Cent.*

EXAM-

EXAMPLES.

6. What is the Brokage of 700*l.* 14*s.* 6*d.* at 4*s. per Cent.*? *Answer* 1*l.* 8*s.* 0*d.* $\frac{1}{4}$.

	l.	*s.*	*d.*
7	00	14	6
	20		
0	14		
	12		
1	74		
	4		
2	96		

		l.	*s.*	*d.*
4	$\frac{1}{5}$	7	0	1 $\frac{3}{2}$
		1	8	0 $\frac{1}{4}$ +

7. What may a Broker demand for Brokage, when he sells Goods to the Value of 500*l.* 10*s.* 7*d.* and I allow him 7*s. per Cent*? *Answ.* 1*l.* 15*s.* 0*d.* $\frac{1}{4}$.

8. Suppose I employ a Broker, who sells Goods to the Value of 909*l.* 14*s.* 10*d.* what is the Brokage at 6*s.* 6*d. per Cent.*? *Answ.* 2*l.* 19*s.* 1*d.* $\frac{1}{4}$.

Note. If the *Brokage* should be 1*l.* or more *per Cent.* the Operation will be the same with that in *Factors Allowances.*

CASE 3.

Q. *How is the* Interest *of any* Sum *found, when the* Rate per Cent. *is* $\frac{1}{4}$, $\frac{1}{2}$, *or* $\frac{3}{4}$ *more than the* Pounds *given in the said* Rate?

A. Multiply the *Principal by the Pounds*, in the *Rate per Cent.* as before; and let the *Parts* for $\frac{1}{4}$, $\frac{1}{2}$, *or* $\frac{3}{4}$, be taken from the *Principal*, and added to that *Product*; then proceed according to *Case* 1 or 2.

EXAMPLES.

1. What is the Interest of 400*l.* for 2 Years, at 5 $\frac{3}{2}$ *per Cent. per Annum*? *Answ.* 44*l.*

2. What is the Interest of 120*l.* for a Year, at 4 $\frac{1}{2}$ *per Cent. per Annum*? *Answ.* 5*l.* 8*s.*

3. What is the Amount of 690*l.* for 3 Years, at 4 $\frac{1}{4}$ *per Cent. per Annum*? *Answ.* 777*l.* 9*s.* 6*d.*

4. What is the Amount of 120*l.* 10*s.* for two Years and an Half, at 4 $\frac{3}{4}$ *per Cent. per Annum*? *Answ.* 134*l.* 16*s.* 1*d.* $\frac{3}{4}$.

5. What is the Interest of 300*l.* for 5 Years and 3 Quarters, at 3 $\frac{1}{4}$ *per Cent. per Annum*? *Answ.* 64*l.* 13*s.* 9*d.*

CASE 4.

Q. *How do you find the* Interest *of any* Sum, *for a certain Number of* Weeks?

A. As 52 Weeks
Are to the Interest of the given Sum for a Year:
So are the Weeks given
To the Interest required.

EXAMPLES.

1. What is the Interest of 400*l.* for a Week, at 5 *per Cent. per Annum? Answ.* 7*s.* 8*d.* 1 *qr.* $\frac{12}{52}$.

2. What is the Interest of 126*l.* 12*s.* for 16 Weeks, at 4 $\frac{1}{2}$ *per Cent. per Annum? Answ.* 1*l.* 15*s.* 0*d.* 2 *qrs.* $\frac{40}{52}$.

3. What is the Amount of 500*l.* for 20 Weeks, at 3 $\frac{1}{2}$ *per Cent. per Annum? Answ.* 506*l.* 14*s.* 7*d.* 1 *qr.* $\frac{28}{52}$.

CASE 5.

Q. *How is the* Principal *found, when the* Amount, Time, *and* Rate per Cent *are given?*

A. As the Amount of 100*l.* at the *Rate* and *Time* given
Is to 100*l.*
So is the *Amount* given
To the *Principal* required.

EXAMPLES.

1. What Principal being put to Interest for 9 Years, at 5 *per Cent. per Annum,* will Amount to 725*l.*? *Answ.* 500*l.*

2. What Principal being put to Interest for 7 Years, will amount to 793*l.* 12*s.* at 4 *per Cent. per Annum? Answ.* 620*l.*

3. What Sum being put to Interest, will amount to 520*l.* 16*s.* in 8 Years, at 3 *per Cent. per Annum? Answ.* 420*l.*

CASE 6.

Q. *How is the* Rate per Cent. *found, when the* Amount, Time, *and* Principal *are given?*

A. 1. As the *Principal*
Is to the *Interest* for the whole *Time:*
So is 100*l.*
To its *Interest* for the same *Time.*

2. Divide the *Interest* last found, by the *Time,* and the Quotient will be the *Rate per Cent.*

EXAMPLES.

1. At what Rate of Interest *per Cent.* will 500*l.* amount to 725*l.* in 9 Years Time? *Answ.* 5 *per Cent.*

2. At what Rate of Interest *per Cent.* will 620*l.* amount to 793*l.* 12*s.* in 7 Years? *Answ.* 4 *per Cent.*

3. At what Rate of Interest *per Cent.* will 420*l.* amount to 520*l.* 16*s.* in 8 Years? *Answ.* 3 *per Cent.*

CASE 7.

Q. *How is the* Time *found when the* Principal, Amount, *and* Rate per Cent. *are given?*

A. As the Interest of the Principal for 1 Year at the given Rate
Is to one Year:
So is the whole Interest
To the Time required.

EXAMPLES.

1. In what Time will 500*l.* amount to 725*l.* at 5 *per Cent. per Annum? Ans.* 9 Years.

2. In what Time will 620*l.* amount to 793*l.* 12*s.* at 4 *per Cent. per Annum? Answ.* 7 *Years.*

3. In what Time will 420*l.* amount to 520*l.* 16*s.* at 3 *per Cent. per Annum? Answ.* 8 *Years.*

Q. *How are the* Questions *in the foregoing* Cases *proved?*

A. Cases 1, 5, 6, and 7, do exactly prove each other, by varying the *Questions*: yet all of them except *Case* 5; and the 1st, 2d, 5th, 6th, and 7th *Questions* in *Case* 1; and the 6th, 7th, and 8th, in *Case* 2, may as truly be answered by the *Double Rule of Three*, of which more hereafter.

Note 1. The 1st, 2d, 5th, 6th, and 7th *Questions* in *Case* 1; and the 6th, 7th, and 8th, in *Case* 2, are to be proved by the *Single Rule* of *Three*.
2. *Case 5th*, cannot be answered by the *Double Rule* of *Three*, because the *Principal* is not known in the *Question*, and therefore there can be no Deduction of it from the *Amount*, to know the *Interest*, which must first be done.

Of Simple Interest *for* Days.

Q. *How do you find the* Interest *for any Number of* Days?

A. Multiply the *Pence* of the *Principal* by the *Days* and by the *Rate* of *Interest* for a *Dividend*, at 365 by 100 for a *Divisor*, the *Quotient* will be the *Answer* in *Pence*.

Q. *How are the following* Questions *proved?*

A. As 365 Days
Are to the Interest of the given sum for a Year;
So is the Time proposed
To the Interest required.

EXAMPLES.

1. What is the Interest of 120*l.* for 126 Days, at 4 *per Cent. per Annum? Answ.* 1*l.* 13*s.* 1*d.* 2*qrs.* $\frac{258}{365}$.

2. What is the Interest of 126*l.* for 145 Days, at 6 *per Cent. per Annum? Answ.* 3*l.* 0*s.* 0*d.* 3 *qrs.* $\frac{57}{365}$.

3. What

3. What is the Interest of 100*l.* from *June* 1, 1787, to *March* 9, 1788, which is Leap-Year, at 5 *per Cent. per Annum?* *Answ.* 3*l.* 17*s.* 6*d.* 1*qr.* $\frac{235}{365}$.

4. What is the Interest of 200*l.* from *August* 14, to *December* 19 following, at 6 *per Cent. per Annum?* *Answ.* 4*l.* 4*s.* 1*d.* 3*qrs.* $\frac{325}{365}$.

5. What is the Interest of 10*l.* for 25 Days, at 5 *per Cent. per Annum?* *Answ.* 8*d.* $\frac{80}{365}$.

6. What is the Interest of 40*l.* for 40 Days, at 4 *per Cent. per Annum?* *Answ.* 3*s.* 6*d.* $\frac{30}{365}$.

See more of *Simple Interest* in *Decimals.*

Of Compound INTEREST.

Q. *What is* Compound Interest?

A. Compound Interest is that which arises from any *Principal* and its *Interest* put together, as the Interest still becomes due, and for that reason it is called *Interest upon Interest*, or *Compound Interest*.

Q. *Is it lawful to let out* Money *at* Compound Interest?

A. No: Yet in purchasing of *Annuities* or *Pensions*, and *Leases* in *Reversion*, it is very usual to allow *Compound Interest* to the Purchaser for his *ready Money*; and therefore it is very necessary to understand it.

Q. *How do you find the* Compound Interest *of any given* Sum for any Number of Years?

A. 1. Find the *Amount* of the given Sum by *Simple Interest*, for the first Year, which is the *Principal* for the second Year, then find the *Amount* of that *Principal* for the second Year, and that is *Principal* for the third Year; and so on for any Number of Years given.

2. Subtract the given Sum from the last *Amount*, and the Remainder is the *Compound Interest* required.

EXAMPLES.

1. What Sum will 450*l.* amount to in 3 Years, at 5 *per Cent. per Annum, Compound Interest?* *Answ.* 520*l.* 18*s.* 7*d.* $\frac{1}{2}$.

2. What will 400*l.* amount to in 4 Years, at 6 *per Cent. per Annum, Compound Interest?* *Answ.* 504*l.* 19*s.* 9*d.* $\frac{1}{4}$.

3. What will 480*l.* amount to in 6 Years, at 5 *per Cent. per Annum, Compound Interest.* *Answ.* 643*l.* 4*s.* 10*d.* $\frac{1}{2}$.

4. What will 500*l.* amount to in 4 Years at 4 $\frac{1}{4}$ *per Cent. per Annum, Compound Interest?* *Answ.* 590*l.* 11*s.* 5*d.* $\frac{1}{2}$.

5. What is the Compound Interest of 400*l.* 10*s.* at 3 $\frac{1}{2}$ *per Cent. per Annum*, for 3 Years? *Answ.* 43*l.* 10*s.* 9*d.* $\frac{1}{2}$.

Note. See more of *Compound Interest* in *Decimals.*

Of

Of REBATE *or* DISCOUNT.

Q. WHAT *is* Rebate *or* Discount?

A. Rebate or *Discount* is when a Sum of Money due at any Time to come, is satisfied by paying so much present Money, as being put out to *Interest*, would amount to the given *Sum* in the same Space of *Time*.

Q. *How is the Operation performed?*

A. 1. As 12 Months
Are to the *Rate per Cent.*
So is the *Time* proposed
To a *fourth Number.*

2. Add that *fourth Number* to 100*l.*

3. As that *Sum*
Is to the *fourth Number*:
So is the given *Sum*
To the *Rebate.*

4. Subtract the *Rebate* from the given *Sum*, and the *Remainder* is the *present Worth.* Or thus,

3. As that *Sum*
Is to 100*l.*
So is the given *Sum*
To the *present Payment.*

4. Subtract the *present Payment* from the given *Sum*, and the *Remainder* is the *Rebate.*

Q. *How do you prove* Questions *in Rebate?*

A. Find the *Amount* of the *present Payment* at the *Time* and *Rate per Cent.* given, and that will be equal to the given *Sum.*

EXAMPLES.

1. What is the Rebate of 795*l.* 11*s.* 2*d.* for 11 Months, at 6 *per Cent.?* *Answ.* 41*l.* 9*s.* 5*d.* 3 *qrs.* $\frac{15}{25}\frac{72}{32}$.

2. What is the present Worth of 161*l.* 10*s.* for 19 Months, at 5 *per Cent.?* *Answ.* 149*l.* 13*s.* 0*d.* $\frac{3}{4}$.

3. Sold Goods for 795*l.* 11*s.* 2*d.* to be paid 4 Months hence, what is the present Worth, at 3 $\frac{1}{2}$ *per Cent.?* *Answ.* 786*l.* 7*s.* 8*d.* $\frac{1}{4}$.

4. What is the present Worth of 4000*l.* payable in 9 Months, at 4 $\frac{3}{4}$ *per Cent.?* *Answ.* 3862*l.* 8*s.* 0*d.* $\frac{1}{2}$.

5. How much ready Money for a Note of 18*l.* due 15 Months hence, at 5 *per Cent.?* *Answ.* 16*l.* 18*s.* 10*d.*

6. Suppose 810*l.* were to be paid 3 Months hence, allowing 5 *per Cent.* Discount, what must be paid in Hand? *Answ.* 800*l.*

7. If

7. If a Legacy of 1000*l.* is left me *July* 24, 1789, to be paid on the *Christmas Day* following; what must I receive when I allow 6 *per Cent.* for present Payment? *Answ.* 975*l.* 3*s.* 1*d.*

8. Being obliged by a Bond bearing Date *August* 29 1787, to pay next *Midsummer* (which is Leap year) 326*l.* what must I pay down, if they allow Discount after the Rate of 8 *per Cent.*? *Answ.* 305*l.* 16*s.* 6*d.* $\frac{1}{4}$.

9. Sold Goods for 312*l.* to be paid at two three Months, (that is, half at 3 Months, and the other half at 3 Months after that) what must be discounted for the present Payment, at 5 *per Cent*? *Answ.* 5*l.* 14*s.* 7*d.*

10. Sold Goods for 300*l.* to be paid at three two Months, (that is, one third at two Months, one third at 4 Months, and one third at 6 Months) what must be discounted for present Payment, at 4 *per Cent.*? *Answ.* 3*l.* 18*s.* 9*d.*

11. What is the present Worth of 100*l.* at 5 *per Cent.* payable at two four Months? *Answ.* 97*l.* 11*s.* 4*d* $\frac{1}{2}$.

12. I would know the present Worth of 150*l.* payable at three four Months, at 5 *per Cent.* Discount? *Answ.* 145*l.* 3*s.* 9*d.* $\frac{1}{7}$.

13. What is the present Worth of 200*l.* at 4 *per Cent.* payable as follows, *viz* 100*l.* at 2 Months; 50*l.* at 3 Months; and 50*l.* at 5 Months? *Answ.* 198*l* 0*s.* 6*d.*

Of EQUATION *of* PAYMENTS;

The common Way.

Q. WHAT *is* Equation *of* Payments?

A. When several Sums of Money, to be paid at different Times, are reduced to one mean Time for the Payment of the Whole, without Loss to *Debtor* or *Creditor*, this is called *Equation* of *Payments.*

Q. *Wherein may the* Debtor *or* Creditor *be said to suffer Loss, when the Debt is paid?*

A. 1. When one *mean Time* is assigned for the Payment of the whole debt, and the Money is not paid till some Time afterwards; then the *Debtor* suffers *Loss* by paying not only the *Principal*, or Sum due, but also the *Interest* of that Sum for the Time of Forbearance, at 3, 4, or more *per Cent.* as they shall agree. Likewise, if the Money be paid before it is due, then the *Creditor* suffers *Loss* by allowing so much *per Cent.* by Agreement for the Time of *prompt Payment.*

2. The

2. The *Loss* to either Party, may be in reducing the several Times of Payment to one, which is not the true equated *Time*; and then if the Payment be made after the true Time, the *Creditor* suffers Loss, because he receives no *Interest* for it: If the Time agreed on be before the true Time, then the *Debtor* suffers *Loss* because he receives no *Interest* for his early Payment.

Q. *How is the Operation wrought?*

A. Multiply each Payment by its Time, and divide the Sum of all the Products by the whole Debt, the Quotient is the *equated Time.*

EXAMPLES.

1. *D* owes *E* 100*l.* whereof 50*l.* is to be paid at 2 Months, and 50*l.* at 4 Months; but they agree to reduce them to one Payment: when must the Whole be paid? *Answ.* 3 *Months.*

2. A Merchant hath owing him 300*l.* to be paid as follows: 50*l.* at 2 Months, 100*l.* at 5 Months, and the rest at 8 Months; and it is agreed to make one Payment of the Whole; I demand when that Time must be? *Answ.* 6 *Months.*

3. *F* owes to *H* 1000*l.* whereof 200*l.* is to be paid present, 400*l.* at 5 Months, and the rest at 10 Months, but they agree to make one Payment of the Whole; I demand the equated Time? *Answ.* 6 *Months.*

4. *K* is indebted to *L* a certain Sum, which is to be discharged at 4 several Payments, that is, $\frac{1}{4}$ at 2 Months, $\frac{1}{4}$ at 4 Months, $\frac{1}{4}$ at 6 Months, and $\frac{1}{4}$ at 8 Months; but they agreeing to make but one Payment of the Whole, the equated Time is therefore demanded? *Answ.* 5 *Months.*

5. *H* bought of *X* a Quantity of Goods upon trust, for which *H* was to pay $\frac{1}{3}$ of the Debt every 3 Months, till the Whole should be discharged: but they afterwards agreed to pay they Whole at one equated Time; the Time is demanded? *Answ.* 6 *Months.*

6. *W* owes *Z* a Sum of Money, which is to be paid, $\frac{1}{4}$ present, $\frac{1}{4}$ at 4 Months, and the rest at 8 Months, what is the equated Time for the Whole? *Answ.* 3 *Months.*

7. *P.* owes ℒ420*l.* which will be due 6 Months hence; but *P* is willing to pay him 60*l.* now, provided he can have the rest forborn a longer Time: It is agreed on; the Time of forbearance therefore is required? *Answ.* 7 *Months.*

Note. This *Question* is in *Reverse Proportion.* See more of this *Rule* in *Decimals.*

Of

Of BARTER.

Q. WHAT *is* Barter?

A. Barter is the Exchanging of one *Commodity* for another, and informs Merchants so to proportion their *Quantities*, as that neither may *sustain Loss.*

Q. *How do you prove Questions in* Barter?

A. By changing the Order of them.

EXAMPLES.

1. How much Sugar at 9*d. per lb.* must be given in Barter for 6 *C.* $\frac{1}{2}$ of Tobacco at 14*d. per lb.*? *Answ.* 10 *C.* 0 *qr.* 12 *lb.* $\frac{4}{9}$.

2. What Quantity of Tea, at 10*s. per lb.* must be given in Barter for 1 *C.* of Chocolate at 4*s. per lb.*? *Answ.* 44 *lb.* 12 *oz.* $\frac{8}{30}$.

3. How much Rice at 28*s. per C. wt.* must be bartered for 3 *C.* $\frac{1}{2}$ of Raisins at 5*d. per lb.*? *Answ.* 5 *C.* 3 *qrs.* 9 *lb.* $\frac{112}{336}$.

4. *D* and *E* bartered: *D* had 5 *C.* of Sugar, at 6*d. per lb.* which he gave to *E* for a Quantity of Cinnamon, at 10*s.* 8*d.* I demand how much Cinnamon *E* gave *D*? *Answ.* 26 *lb.* 4 *oz.*

5. *B* delivered 3 *Hhds.* of Brandy, at 6*s.* 8*d. per* Gallon, to *C* for 126 Yards of Cloth; what was the Cloth *per* Yard? *Answ.* 10*s.*

6. *D* and *E* bartered: *D* had 12 *C.* of Sugar, worth 4*d. per lb.* for which *E* gave him 1 *C.* $\frac{3}{4}$ of Cinnamon; I demand how *E* rated his Cinnamon *per lb.*? *Answ.* 27*d.* 1 *qr.* $\frac{140}{196}$.

7. *D* hath Linen Cloth worth 20*d.* an Ell ready Money; but in Barter he will have 2*s.* *E* hath Broad Cloth worth 14*s.* 6*d. per* Yard ready Money; at what Price ought the Broad Cloth to be rated in Barter? *Answ.* 17*s.* 4*d.* 3 *qrs.* $\frac{4}{20}$ *per Yard.*

8. *D* and *E* bartered: *D* had 41 *C. wt.* of Hops at 30*s. per C.* for which *E* gave him 20*l.* in Money; and the rest in Prunes, at 5*d. per lb.* I demand how many Prunes *E* gave D, besides the 20*l.*? *Answ.* 17 *C.* 3 *qrs.* 4 *lb.*

9. *C* hath Candles at 6*s. per* Dozen, ready Money; but in Barter he will have 6*s.* 6*d. per* Dozen; *D* hath Cotton at 9*d. per lb.* ready Money; I demand what Price the Cotton must be at in Barter; also how much Cotten must be bartered for 100 Dozen of Candles? *Answ. The Cotton is* 9*d.* 3 *qrs. per lb. in Barter; and* 7 *C.* 0 *qr.* 16*lb of Cotton must be given for* 100 *Dozen of Candles.*

Of

Of LOSS *and* GAIN.

Q. WHAT *is* Loss *and* Gain?

A. Loss and *Gain* is a Rule which teacheth *Merchants* what they shall *gain* or *lose* in the Sale of their Goods, having the *Price* that they bought them for, and the *Price* for which they are to be sold, both known.

Q. *How are the following* Questions *proved?*

A. Let them be varied.

EXAMPLES.

1. Bought 18 *C.* of Cheese, at 28*s.* *per C.* which I sell out again at 3*d.* ½ *per lb.* what is the Profit in the Whole? *Answ.* 4*l.* 4*s.*

2. If I buy Deals in at 20*d.* a-piece, and sell them again at 17*d.* what shall I lose by 120 Dozen? *Answ.* 18*l.*

3. Hats bought at 4*s.* a-piece, and sold again at 4*s.* 9*d.* what is the Profit in laying out 100*l.*? *Answ.* 18*l.* 15*s.*

4. Bought 19 Fother of Lead at 14*s.* *per C.* what is gained by the Whole, sold out at 4*d.* *per lb.*? *Answ.* 432*l.* 5*s.*

5. Bought 60 Reams of Paper, at 15*s.* *per* Ream, what is the Loss in the whole Quantity, at 4 *per Cent.*? *Answ.* 1*l.* 16*s.*

6. Bought 7 Tuns of Wine, at 17*l.* *per Hhd.* which I sell again at 1*s.* *per* Pint; I demand the whole Gain, and the Gain *per Cent.*? *Answ.* 229*l.* 12*s.* *whole Gain; and* 48*l.* 4*s.* 8*d.* 1 *qr.* $\frac{420}{476}$. *the Gain per Cent.*

7. If I sell 500 Deals at 15*d.* a-piece, and 9*l.* *per Cent.* Loss; what do I lose in the whole Quantity? *Answ.* 2*l.* 16*s.* 3*d.*

8. Bought 3 Oxen for 24*l.* 10*s.* which I sell again for 2*s.* *per* Stone; what ought the 3 Oxen to weigh together, the Hides and Offal being the only clear Gain? *Answ.* 245 *Stone.*

9. A Draper bought 100 Yards of Broad Cloth, for which he gave 56*l.* I desire to know how he must sell it *per* Yard, to gain 19*l.* in the Whole? *Answ.* 15*s.* *per Yard.*

10. A Draper bought 100 Yards of Broad Cloth for 56*l.* I demand how he must sell it *per Yard* to gain 15*l.* in laying out 100*l.*? *Answ.* 12*s.* 10*d.* 2 *qrs.* $\frac{24}{100}$.

Of FELLOWSHIP.

Q. HOW *many Sorts of* Fellowship *are there?*

A. Two; *Single* and *Compound.*

Of SINGLE FELLOWSHIP.

Q. *What is* Single Fellowship?

A. Single Fellowship is when the Stocks of each Partner continue for an equal Term of Time.

Q. *What is the* Rule?

A. As the *Sum* of the several *Stocks*
Is to the *Total Gain* or *Loss*:
So is each Man's Share in *Stock*
To his *Share* of the *Gain* or *Loss*.

Q. *How is this* Rule *proved?*

A. Add all the *Shares* together, and the Sum will be equal to the given *Gain* or *Loss*.

Note. This Way of proving *Fellowship* will not hold good always: For if an *Error* should be committed in the Beginning of the Work, and carried on through the whole Operation, yet the same will prove, though each Man's *Share* of the *Gain* or *Loss* assigned him by that Operation be either more or less than his true *Share*. The most exact Method, then, that I would propose, though something more tedious, is to change the Order of the Question, and put each Man's *Share* of the *Gain* or *Loss* in the Place of his *Stock* first laid out, and make the *Sum* of the *Stock* stand in the Place of the *whole Gain* or *Loss*, and then it will be,

As the *Total Gain* or *Loss*
Is to the *Sum* of the several *Stocks*:
So is each Man's *Share* of the *Gain* or *Loss*
To his particular *Share* in *Stock*.

Q. *What else doth this Rule belong to beside* Fellowship?

A. By it the Estate of a Bankrupt may be divided among his Creditors: Also Legacies may be adjusted, when there is a Deficiency of Assets or Effects.

EXAMPLES.

1. *D* and *E* were Sharers in a Parcel of Merchandize, in the Purchase of which, *D* laid out 3*l.* and *E* 7*l.* and the Commodity being sold, they find their clear Gain amount to 25*s.* what Part of it must each Man have? *Answ. D must have* 7*s.* 6*d. and E* 17*s.* 6*d.*

2. *D*, *E*, and *F*, trading together, gained 120*l.* which is to be shared according to each Man's Stock; *D* put in 140*l.* *E* 300*l.* and *F* 160*l.* what is each Man's Share? *Answ. D* 28*l.* *E* 60*l.* *F* 32*l.*

3. Three Merchants trading to *Virginia*, lost Goods to the Value of 800*l.* Now if *D*'s Stock was 1200*l.* *E*'s 4800*l.* and *F*'s 2000*l.* what Sum did each Man lose? *Answ. D lost* 120*l.* *E* 480*l.* *F* 200*l.*

4. Three Merchants traded together, and they put into one common Stock 1000*l.* each Man, and gained 600*l.* how much must each Man have? *Answer* 200*l. each Man.*

5. Four Men traded with a Stock of 800*l.* and they gained in two Years Time twice as much and 40*l.* over; *D*'s Stock was 140*l.* *E*'s 260*l.* *F*'s 300*l.* I demand *G*'s Stock, and what each Man gained by trading? *Answ. G*'s *Stock was* 100*l. and D gained* 287*l.* *E* 533*l.* *F* 615*l. and G* 205*l.*

6. *B*,

6. *B. C*, and *E*, trading to *Guinea* with 480*l.* 680*l.* and 840*l.* in three Years Time did gain 1010*l.* how much is each Man's Share of the Gain? *Answ. B* 242*l.* 8*s.* *C* 343*l.* 8*s.* *E* 424*l.* 4*s.*

7. *B*, *C*, and *E*, freighted a ship from the *Canaries* to *England*, with 108 Tuns of Wine, of which *B* had 48; *C* 36; *E* 24; but by reason of bad Weather, they were obliged to cast 45 Tuns overboard; how much must each Man sustain of the Loss? *Answ. B* 20 *Tuns*, *C* 15 *Tuns*, *E* 10 *Tuns*.

8. A Merchant is indebted to *S* 70*l.* to *T* 400*l.* to *V* 140*l.* 12*s.* 6*d.* but upon his Decease, his Estate is found to be worth no more than 409*l.* 14*s.* how must it be divided among his Creditors? *Answ. S must have* 46*l.* 19*s.* 3*d.* 3 *qrs.* $\frac{14175}{14650}$.

T	- -	268	7	7	1	$\frac{77250}{14650}$.
V	- -	94	7	0	2	$\frac{74100}{14650}$.

9. If the Money and Effects of a Bankrupt amount to 1400*l.* 14*s.* 6*d.* and he is indebted to *B* 742*l.* 12*s.* to *C* 641*l.* 19*s.* 8*d.* and to *D* 987*l.* 19*s.* 9*d.* how must it be divided among them? *Answ. B must have* 438*l.* 8*s.* 4*d.* 1 *qr.* $\frac{303527}{56947}$.

C	- -	379	0	3	3	$\frac{158461}{56947}$.
D	- -	583	5	9	3	$\frac{107529}{56947}$.

Of COMPOUND FELLOWSHIP.

Q. *What is* Compound Fellowship?

A. Compound Fellowship is when the *Stocks* continue an unequal Term of Time.

Q. *What is the* Rule?

A. 1. Multiply each Man's *Stock* and *Time* together.

2. Add the several *Products* thence arising together.

3. As the *Sum* of those *Products*
Is to the whole *Gain* or *Loss*:
So is each *Product*
To its *Share* of the *Gain* or *Loss*.

Q. *How is this* Rule *proved?*

A. As in *Single Fellowship*.

EXAMPLES.

1. Three Merchants traded together: *B* put in 120*l.* for 9 Months; *C* 100*l.* for 16 Months; and *D* 100*l.* for 14 Months; and they gained 100*l.* how must it be divided? *Answ.*

B must have 26*l.* 9*s.* 4*d.* 3 *qrs.* $\frac{3120}{4080}$.

C	- -	39	4	3	3	$\frac{240}{4080}$.
D	- -	34	6	3	1	$\frac{720}{4080}$.

2. Three

2. Three Merchants join in Trade; *B* put in 400*l.* for 9 Months; *C* 680*l.* for 5 Months; and *D* 120*l.* for 12 Months; but by Misfortune lost Goods to the Value of 500*l.* what must each Man sustain of the Loss?

		l.	*s.*	*d.*	*qrs.*
Answ.	*B must lose* -	213	5	4	3 $\frac{2840}{8440}$.
	C - - -	201	8	5	0 $\frac{7840}{8440}$.
	D - - -	85	6	1	3 $\frac{6200}{8440}$.

3. *B*, *C*, and *D*, hold a Pasture in common, for which they pay 20*l. per Annum.* In this Pasture *B* had 40 Oxen for 76 Days; *C* had 36 Oxen for 50 Days; and *D* had 50 Oxen for 90 Days. I demand what Part every of these Tenants ought to pay of the 20*l.*?

		l.	*s.*	*d.*	*qrs.*
Answ.	*B ought to pay*	6	10	2	1 $\frac{8340}{9340}$.
	C - - -	3	17	1	0 $\frac{2000}{9340}$.
	D - - -	9	12	8	2 $\frac{5000}{9340}$.

Of EXCHANGE.

Q. WHAT *is* Exchange?

A. Exchange is the giving the Money, Weight or Measure of one Country, for the like Value in Bills, Money, Weight or Measure of another Country.

Q. *What is the Course of* Exchange?

A. It is the Value of Money agreed on among Merchants.

Q. *Is the* Course *of* Exchange *always the same?*

A. No: The *Course* of *Exchange* rises or falls almost every Day, according as Money is plenty or scarce; or according to the Time allowed for the Payment of the Money in *Exchange*; and then the Value is said to be above or under *Par.*

Q. *What is the Par of* Exchange?

A. It is the intrinsic Value of any foreign Money compared with Sterling Money.

Q. *What is the* Agio?

A. It is a Term used in some Countries abroad, especially in *Italy*, but never in *England;* and signifies the Difference between the Value of Bank-Notes or Bank-Money, and Current-Money, in such Places; that is, it is the Difference between the best Money used in the Terms of Exchange; and the worst used in Payment for Goods.

Q. *What is meant by* Bank-Notes, *or* Bank-Money?

A. Bank Notes are obtained from foreign Bankers, for Money lodged in their Banks, which Money is called *Bank-Money.*

Q. *What is* Current-Money? *A.* It

A. It is such as passes from Hand to Hand, in the receiving and paying such Sums as are due from one Man to another; commonly called *Running Cash.*

Q. *What is* Usance?

A. It is a certain Time allowed for the Payment of Bills of *Exchange;* but different according to the Usage or Custom of the Place where the Bill is made, compared with the Distance of that Place, on which the Bill is drawn, that is, the nearer the Place on which the Bill is drawn, is to the Place where it was drawn, the Time is the shorter; but the farther those Places are from each other, the Length of Time allowed for the Payment of that Bill, from the Date of it, is the greater.

Note, Bills are payable five Ways, *viz.*

1. At *Sight.*
2. At so many Days after *Sight.*
3. At *Usance,* or a certain Length of Time agreed on between the two Places:
4. At *Double Usance,* which is double the Time agreed on between the two Places.
5. At *Marts* or *Fairs;* which is to be understoood at some certain Days accounted for Fairs in the said Places where the Bills are made payable.

Q. *What are the Days of* Grace?

A. In *London* it is customary to allow three Days to the Time mentioned in the Bill, which are called Days of Grace, on the last Day of which (if it be not on a *Sunday,* but if it is on *Saturday)* the Bill must be demanded, and if not then paid, must be immediately protested.

Note. In some Places they allow a larger Number of Days of Grace, than we do at *London;* and in others none at all.

Q. *How are Questions in* Exchange *proved?*

A. By changing the Order of them.

CASE I.

Q. *What Places does* London *exchange with in* Dollars, *or* Peices *of* Eight *of* Mexico?

A. With *Madrid* and *Cadiz,* in *Spain,* and with *Genoa* and *Leghorn* in *Italy.*

Q. *How do they keep their Accompts in* Spain?

A. In *Rials* and *Marvedies.*

Note 372 Marvidies make 1 Rial
8 Rials —— 1 Piece of Eight.

Q. *What is the* Par *of* Exchange *between* London *and* Spain?

A. The *Par* of the Money between *London* and *Spain* is, that 1900 Rials are exactly equal to 51*l.* Sterling; consequently 1 Rial is worth 6*d.* 1*qr.* $\frac{73}{95}$.

Note 1. *Spain* gives to *London* 1 Dollar or Peice of Eight for an uncertain Number of Pence Sterling.

2. In *Spain* they allow 14 Days of Grace.

Q. *How do they keep ther Accompts in* Italy?

A. In *Livres*, *Sols*, and *Deniers*; some few Cities excepted.

Note 1. 12 Deniers make 1 Sol.
20 Sols —— 1 Livre.
5 Livres —— 1 Piece of Eight at *Genoa*.
6 Livres —— 1 Piece of Eight at *Leghorn*.

2. The *Usance* of *Genoa* to *London* is 3 Months after Date.

3. At *Genoa* they allow 30 Days of Grace.

EXAMPLES.

1. What is the Amount of 63*l.* Sterling in Pieces of Eight at 56*d.* *per* Piece? *Answ.* 270 *Pieces of Eight.*

2. A Factor hath sold Goods at *Cadiz* for 1468 Pieces of Eight at 4*s.* 6*d.* 2 *qrs.* *per* Piece; how much Sterling is the Sum? *Answ.* 333*l.* 7*s.* 2*d.*

A Bill of Exchange, *viz.* *Leghorn* on *London.*

Leghorn, *July* 31, 1796, for 786 Pieces of Eight of *Mexico*, at 55*d.* Sterling *per* Piece of Eight, at 3 Months.

Three Months after Date, pay this my first of Exchange to Mr. *James La Morte*, or Order, Seven Hundred and Eighty-six Pieces of Eight of *Mexico*, for the Value received of himself, at 55*d.* Sterling *per* Piece, and place it to Accompt, as *per* Advice from

To Mr. *William Mayhow*, Merchant in *London*. Your humble Servant, *James Douglas.*

How much Money must be received in *England* for this Bill? *Answ.* 180*l.* 2*s.* 6*d.*

CASE 2.

Q. *What Place does* London *exchange with in* Ducats?

A. With *Venice* in *Italy.*

Note. 6 Solidi make 1 Gross.
24 Grosses — 1 Ducat.

Q. *What is the* Par *of* Exchange *between* London *and* Venice?

A. One Hundred Livres are worth three Pounds Sterling.

Q. *How many Sorts of Ducats are there at* Venice?

A. Two Sorts, *viz.* Ducats *Banco*, or Bank Ducats, which are usually given in Exchange; and Ducats *Picoli*, or Current Ducats, which are usually bargained for and paid in the Purchase of Goods and Merchandizes, and are at 20 *per Cent.* worse than the Bank Ducats.

Note 1. The Par of the *Ducat Banco*, is 52 Pence Sterling; and the Par of the *Ducat Picoli* is 40*d.* Sterling.

2. The *Usance* of *Venice* to *London* and back again in 3 Months, or 90 Days after Date: *Two Usance* is at that Time doubled.

EXAMPLES.

1. If 100 Livres are worth 3*l.* Sterling, what is 1 Livre worth? *Answ.* 7*d.* $\frac{1}{5}$ *Sterling.*

2. There

2. There are 2000 Ducats at 4*s.* 4*d.* each, remitted to *London*, to be paid in Pounds Sterling; what is the Amount? *Answ.* 433*l.* 6*s.* 8*d.*

3. A Bill of 100*l.* Sterling is remitted to *Venice*, to be paid in Ducats, at 4*s.* 4*d.* each; what is the Amount? *Answ.* 461 $\frac{28}{52}$ *Ducats.*

4. A Traveller would exchange 233*l.* 16*s.* 8*d.* Sterling, for *Venice* Ducats, at 4*s.* 9*d.* *per* Ducat; how many must he have? *Answ.* 984 $\frac{32}{57}$ *Ducats.*

A Bill of Exchange, *viz.* *Venice* on *London.*

Venice, *August* 17th, 1790, for 4000 Ducats *Banco*, at 54*d.* $\frac{1}{4}$ Sterling *per* Ducat, at *Usance.*

At *Usance* pay this my first Bill of Exchange, to Mr. *Abraham Jennings*, or Order, Four Thousand Ducats, at fifty-four Pence Farthing Sterling *per* Ducat, Value received; and place it to the Accompt of

To *Samuel Jones*, Esq.
Merchant in *London.*

Your humble Servant,
William Sherstone.

I demand the Value of this Bill in Sterling Money? *Answ.* 904*l.* 3*s.* 4*d.*

Another, *viz.* *London* on *Venice.*

London, *September* 14th, 1790, for 904*l.* 3*s.* 4*d.* Sterling, to be paid at *Venice*, in Ducats, at 54*d.* $\frac{1}{4}$ Sterling *per* Ducat *Banco* at *Usance.*

At Usance, pay this my second Bill of Exchange, my first not paid, to Mr. *Samuel Dobbins*, or Order, Nine Hundred and four Pounds, three Shillings and four Pence Sterling, in Ducats, at fifty four Pence Farthing *per* Ducat, Value in myself, and place it to Accompt, as *per* Advice from

To Mr. *James Torriano*,
Merchant at *Venice.*

Your humble Servant,
Michael Tassio.

What is the Value of this Bill in Ducats Banco? *Answ.* 4000 *Ducats.*

CASE 3.

Q. *What Places does* London *exchange with for* French *Crowns?*

A. With *Paris*, *Lyons*, *Rouen*, *&c.* in *France.*

Q. *How do they keep their Accompts in* France?

A. In *Livres*, *Sols*, and *Deniers.*

Note 1. 12 Deniers make 1 Sol.
20 Sols —— 1 Livre.
3 Livres —— 1 Crown.

2. The Livre is imaginary.

3. By or Order of *Lewis* XV. their Money is brought to the *English* Standard for the Benefit of Trade.

Q. *What*

Q. *What is the* Par *of* Exchange *between* London *and* France?

A. One Livre is worth 18*d.* Sterling; and one Crown is worth 4*s.* 6*d.* Sterling.

Note 1. In *France* they allow 10 Days of Grace; But when Bills are drawn at *Sight*, they are payable the same Day.

2. The *Usance* between *France* and *London* is one *Month* consisting of 30 Days.

EXAMPLES.

1. A Bill of 200*l.* is remitted to *Paris* by a Merchant in *London*; what is the Value in *French* Crowns, at 4*s.* 6*d.* each? *Answ.* 888 $\frac{48}{54}$ *Crowns.*

2. There are 800 *French Crowns*, at 4*s* 6*d.* each, remitted to *London* by a Merchant in *Paris*; what is the Value in Pounds Sterling? *Answ.* 180*l. Sterling.*

A Bill of Exchange, *viz. Paris* on *London.*

Paris, September 17, 1790, for 1000 Crowns, at 4*s.* 2*d.* at 2 Usance.

At double Usance, pay this my second Bill of Exchange, my first not paid, to Mr. *James Jackson*, or Order, the Sum of One Thousand Crowns, at four Shillings and two Pence *per* Crown, Value received, and place it to Account, as *per* Advice of

To Mr. Simon Surepay, London. Your Humble Servant, *Daniel Abbot.*

What is the Value of this Bill in Sterling Money? *Answ.* 208*l.* 6*s.* 8*d.*

CASE 4.

Q. *What Places does* London *exchange with for* Mill Reas?

A. With *Oporto* and *Lisbon, &c.* in *Portugal*; and with the Island of *Madeira.*

Q. *How do they keep their Accompts in* Portugal?

A. In Reas.

Note. 1,000 Reas make 1 Mill-Rea.

2. They separate the *Reas* from the *Mill-Reas* by some Particular Mark, thus, 687 ⊖ 496, that is, 687 *Mill-Reas*, and 496 *Reas*, which is the same with 687,496 Reas.

3. Very near 14 Reas, or 13 $\frac{1}{3}$ Reas make 1 Penny *English.*

Q. *What is the* Par *of* Exchange *between* London *and* Portugal?

A. One *Mill-Rea* is worth 5*s.* 7*d.* $\frac{1}{2}$, which appears thus:

800 Reas (or a Testoon Piece) are	=	4*s.*	6*d.*
200 Reas (or fourth Part)	=	1	1 $\frac{1}{2}$
1000		5	7 $\frac{1}{2}$

Note, The *Usance* between *London* and *Portugal* is two Months, or 60 Days after Date.

EXAMPLES.

EXAMPLES.

1. If a Bill is drawn from *Lisbon*, of 1432 Mill reas, at 6*s.* 8*d. per* Piece: how much *English* Money is that Bill? *Answ.* 477*l.* 6*s.* 8*d.*

2. If a Bill be drawn from *London*, of 1333*l.* 6*s.* 8*d.* Sterling, how much is it at *Lisbon* in Mill Reas, at 6*s.* 8*d.* each? *Answ.* 4000 *Mill-reas.*

A Bill of Exchange, *viz. Lisbon* on *London.*

Lisbon, October 14, 1790, for 4761 ⊖ 764, at 5*s.* 8*d.* at Usance.

At Usance, pay this my first of Exchange to Mr. *Henry Sozomon*, or Order, Four Thousand Seven Hundred and Sixty-one Mill-reas, Seven Hundred and Sixty-four Reas, at five Shillings and eight Pence Sterling *per* Mill rea, Value received; and place it to the Accompt of

Your humble Servant,

To Mr. *Jacques Joliffe*,
Merchant *in London.*

John Minors.

What is the Value of this Bill in Sterling Money? *Answ.* 1349*l.* 3*s.* 3*d.* 3 *qrs.* $\frac{808}{1000}$.

CASE 5.

Q. *What Place does* London *exchange with for* Ducatoons, Crowns *or* Ecues?

A. With *Florence* in *Italy.*

Q. *How do they keep their Accompts in* Florence?

A. In *Ecues, Sols,* and *Deniers,* Picoli or Current.

Note. 12 Deniers make 1 Sol.
20 Sols —— 1 Ecu, Crown or Ducatoon.

Q. *What is the* Par *of* Exchange *between* London *and* Florence?

A. One *Ecu, Crown* or *Ducatoon* is worth 60*d.* Sterling.

Note. The *Usance* between *Florence* and *London* is 3 Months, or 90 Days after Date.

EXAMPLES.

1. A Bill of 120 Ducatoons is remitted from *Florence*, at 53*d.* each; what is the Value in Pounds Sterling? *Answ.* 26*l.* 10*s.*

2. A Bill of 220*l.* 16*s.* 8*d.* is drawn from *London*, what is the Value at *Florence*, in Ducatoons, or Ecues, at 53*d.* ½ each? *Answ.* 990 $\frac{70}{107}$ *Ecues.*

A Bill of Exchange, *viz. Florence* on *London.*

Florence, October 19, 1790, for 1876 Ecues, at 63*d.* Sterling *per* Ecu, at Usance.

At Usance, pay this my third of Exchange, my first and second not paid, to Mr. *Jonathan Farmento*, or Order, One Thousand Eight Hundred and Seventy-six Ecues, at 63*d.* Sterling *per* Ecu, Value received, and place it to the Accompt of

Your humble Servant,

To Mr. *John Jameson*,
Merchant in *London.*

Michael Tassioni.

What is the Value of this Bill in Sterling Money? *Answ.* 492*l.* 9*s.*

CASE 6.

Q. *What Place does* London *exchange with for* Florins?

A. With *Frankfort* in *Germany.*

Q. *How do they keep their Accompts in* Frankfort?

A. In *Goulds*, *Cruitzers*, and *Deniers* or *Fennings.*

Note. 8 Fennings, or 4 Deniers make 1 Cruitzer.
60 Cruitzers - - - —— 1 Gould, or Guilder.

Q. *What is the Par of* Exchange *between* London *and* Frankfort?

A. Twenty Florins are equal to 3*l.* Sterling.

Note. When they exchange or negociate Bills for *London*, *Holland* or *Flanders*, the Bills are paid in *Goulds* of 65 *Cruitzers*; and for *France*, *Hamburg* and *Italy*, in *Goulds* of 60 *Cruitzers*; and sometimes in *Rix-Dollars* at 4*s.* 6*d.* *Sterling*, and at so much *per Cent. Profit* or *Loss.*

EXAMPLES.

1. If 20 Florins are equal to 3*l.* Sterling, what is the worth of 1 Florin? *Answ.* 3*s.* *Sterling.*

2. If 1000*l.* Sterling be remitted to *Frankfort*, what is the Value in Florins at 39*d.* *per* Piece? *Answ.* 6153 $\frac{33}{39}$.

3. If 100 Florins at 40*d.* $\frac{1}{2}$ each, be remitted from *Frankfort* to *London*, what is the Value in *l.* Sterling? *Answ.* 16*l.* 17*s.* 6*d.*

A Bill of Exchange, *viz. London* on *Frankfort.*

London, *September* 12, 1790, for 763*l.* 10*s.* Sterling, to be paid in *Florins* at 41*d.* Sterling each, at Usance.

At Usance, pay this my second of Exchange, my first not paid, to Mr. *Jacobus Sanderson*, or Order, seven Hundred Sixty-three Pounds, ten Shillings Sterling, in Florins at 41*d.* Sterling *per* Florin; Value received, and place it to Accompt as *per* Advice from

Your humble Servant,
James Johnson.

To Mr. *William Maron*,
Merchant in *Frankfort.*

What is the Value of this Bill in Florins? *Answ.* 4469 $\frac{11}{41}$ *Florins.*

CASE 7.

Q. *What Places does* London *exchange with by the Pound Flemish or Pound Sterling?*

A. With *Antwerp*, *Brussels*, *Amsterdam*, *Rotterdam*, and all Parts of the *Spanish* and *United Provinces.* Also with *Hamburg* in *Germany.*

Q. *How*

Q. *How do they keep their Accompts in these Places.?*

A. Some in Pounds, Shillings and Pence, as in *England*; and others in Guilders, Stivers and Pennics.

Note. 16 Pennics make 1 Stiver.
20 Stivers —— 1 Guilder. Also,
6 Stivers —— 1 Shilling.
6 Guilders —— 1 Pound Flemish.

2. The *Par* of Exchange between *London* and *Holland* is, that 9*l.* Sterling are equal to 100 Florins.

3. A Florin is worth 3*s.* 2*d.* 2-5 Flemish.

4. The Prices of the Exchange at *London*, *Hamburg*, and *Amsterdam*, are said to have very great Influence upon all the rest of Europe.

Q. *What is the* Par *of* Exchange *between* London *and* Antwerp?

A. Sixteen Pounds Flemish are equal to Nine Pounds Sterling: So that 1*l* Flemish is equal to 11 Shillings and 3 Pence Sterling, and 1*l.* Sterling is equal to 35*s.* 6*d.* $\frac{2}{5}$ *Flemish.*

EXAMPLES.

1. Being desirous to remit to my Correspondent at *London*, the Sum of 2000*l.* 12*s.* 6*d.* Flemish, to dispose of according to my Order, Exchange at 34*s.* 6*d.* Flemish *per* Pound Sterling; how much Money Sterling shall I be Creditor for in the City of *London* aforesaid? *Answ.* 1159*l.* 15*s.* 7*d.* 3 *qrs.* $\frac{126}{414}$.

2. My Correspondent in *England* gives me notice that he has disbursed in Merchandize, upon my Account, the Sum of 1000*l.* Sterling; what Sum must I answer for that in *Holland*, the Course of Exchange being at 33*s.* 4*d.* Flemish for one Pound Sterling? *Answ.* 1666*l.* 13*s.* 4*d.* *Flemish.*

Note. When the Course of Exchange is at 33*s.* 4*d.* Flemish for 1 Pound Sterling, then to bring Flemish Money into English Money multiply the Flemish Money by 3, and divide that Product by 5, the Quotient will give the Answer in Pounds Sterling: And the Contrary.

3. My Correspondent in *Rotterdam* sends me Word, that he has disbursed upon my Account, the Sum of 3060 Guilders and 15 Stivers; what Sum must I answer for that at *London*, the Course of Exchange being at 37*s.* 9*d.* Flemish *per l.* Sterling? *Answ.* 270*l.* 5*s.* 3*d.* 1 *qr.* $\frac{188}{453}$.

Note. A Stiver is 2*d.* Flemish, and a Guilder 40*d.*

4. A Merchant delivered at *London* 120*l.* Sterling, to receive 147*l.* Flemish in *Amsterdam*; how much was 1*l.* valued at in Flemish Money? *Answ.* 1*l.* 4*s.* 6*d.*

5. If 1 Florin is worth 3*s.* 2*d.* $\frac{2}{5}$ Flemish, and 100 Florins are equal to 9*l.* Sterling, how much is the real Worth of 1*l.* Sterling in Flemish Money? *Answ.* 35*s.* 6*d.* $\frac{6}{9}$.

1*fl.* : : 3*s.* 2*d.* $\frac{2}{5}$: : 100*fl.* : 16*l.* *Flem.*
9 : 16 : : 1 : 35*s.* 6*d.* $\frac{6}{9}$ *Flem.*

Of

Of Reducing the Current Money of Holland *into Bank Money; and the Contrary.*

EXAMPLES.

1. Being in *Holland*, I have 1000 Guilders, Current Money, which I would turn into Bank-Money, the Agio being at 5 Guilders *per Cent.* how much is it? *Answ.* 952 *Guilders Banco*, $\frac{40}{105}$.

G. Cur. G B. G. Cur. G. B.

105 : 100 : : 1000 : 952 $\frac{40}{105}$.

2. My Correspondent in *Amsterdam* having wrote me Word that he had by him of mine 2763 Guilders, 15 Stivers, Currency, I have directed him to turn the same into Bank-Money, the Agio being (as I am informed) 5 Guilders $\frac{1}{2}$ *per Cent.* I demand how much Bank-Money it will make? *Answ.* 2619 *Guilders*, 13 $\frac{77}{211}$ *Stivers Bank-Money.*

G. Cur. G. B. G S. Cur. G. B. S.

105 $\frac{1}{2}$: 100 : : 2763 „ 15 2619 : 13 $\frac{77}{211}$.

3. *Holland* is indebted to *London* 7681 Guilders, Current Money, and would know how much Sterling it will amount to, Exchange at 35*s.* 6*d.* Banco *per l.* Sterling, Agio at 5 *per Cent.* How much is it? *Answ.* 686*l.* 17*s.* 6*d.* $\frac{60}{426}$ *Sterling.*

G. C. G. B°. G. C. G. B° St. Pen.

105 : 100 : : 7681 : 7315 4 1 $\frac{20}{105}$.

s. d. l.St. G.B. S. P.

35 6 : 1 : : 7315 4 1 : 686*l.* 17*s.* 6*d.* 1 *qr.* $\frac{2352}{3406}$ $\frac{60}{426}$.

4. *Amsterdam* remits to *London* 1090 Guilders 17 $\frac{1}{2}$ Stivers, at 33*s.* 8*d.* Banco *per l.* Sterling: What will this Remittance amount to at *London* in Sterling Money? *Answ.* 108*l.* 0*s.* 1*d.* 3 *qrs.* $\frac{52}{404}$ *Sterling.*

Note. The above Money is supposed to be reduced into Bank-Money already.

s. d. l.St. G. St.B. £. s. d. qrs.

33 8 : 1 : : 1090 „ 17 $\frac{1}{2}$: 108 0 1 3 $\frac{52}{404}$.

Of the Sale of Gold in Holland.

Note. All Gold is bought and sold at *Amsterdam* by Weight; that is, 355 Guilders Current *per Mark* of that Weight.

EXAMPLES.

A Merchant in *London* sends over to his Correspondent at *Amsterdam*, 1000 Moidores, valued at 27*s.* Sterling each, the Charges on Shipping came to 5*l.* 19*s.* 6*d.* when they came to the Place consigned, and were weighed, they amounted to 14209 Guilders, 14 Stivers Currency, all charges there deducted; I demand what was their Value in *English* Money, and

and how much the *London* Merchant gained or lost by his Moidores, admitting the Agio to be 5 Guilders *per Cent.* and the Course of Exchange 33*s.* 6*d.* B. Flemish *per l.* Sterling? *Answ.* 12*l.* 15*s.* 4*d. Loss.*

1. 1000 *Ms.* + 5*l.* 19*s.* 6*d.* = 1355*l.* 19*s.* 6*d.*
   G. *G.* *G.* *St.* *G.* *St.*
2. 100 : 5 : : 14209 „ 14 : 710 9
   Gu. *St.* *Gu.* *St.* *Gu.* *St.*
3. 14209 „ 14 — 710 „ 9 = 13499 „ 5
   s. *d.* *l.* *G.* *S.* *l.* *s.* *d.*
4. 33 6 : 1 : : 13499 „ 5 : 1343 4 2
5. 1355*l.* 19*s.* 6*d.*—1343*l.* 4*s.* 2*d.* = 12*l.* 15*s.* 4*d.*

London, September 14, 1790, for 436*l.* 17*s.* Sterling, at 34*s.* 6*d.* Flemish *per l.* Sterling, at Usance.

At Usance, pay this my first of Exchange, to *Jacob Van Hoove*, or Order, Four Hundred thirty-six Pounds, seventeen Shillings Sterling, Value received of *William Jackson*, Esq. and place it to Accompt, as *per* Advice from

To Mr. *James Juliers*, Merchant, *Rotterdam.* — Your Humble Servant. *Thomas Cartwright.*

What is the Value of this Bill in Flemish Money? *Answ.* 753*l.* 11*s.* 3*d.* $\frac{18}{20}$.

Also in Guilders and Stivers? *Answ.* 4521 *Guil.* 7 *Stiv.*

s.	*d.*	*l.*	*s.*
34	6	436	17
12		414	
414		1747	8
		4368	5
		174740	0

4|0)18085|5 13(4521 7 *Answ.* (*Gu.* *St.*)
15

Another, *viz. Rotterdam* on *London.*

Rotterdam, September 19, 1790, for 7693 Guilders, 17 Stivers, at 35*s.* 6*d.* Flemish *per l.* Sterling.

At Usance, pay this my second Bill of Exchange, my first not paid, to *James Truelove*, or Order, seven Thousand, six Hundred ninety-three Guilders, seventeen Stivers, at 35*s.* 6*d.* Flemish *per l.* Sterling, Value received of *Jacques Jacobson*, and place it to Accompt, as *per* Advice from

To *James Jolles*, Esq. Merchant in *London.* — Your humble Servant, *Johannes Van Shooten.*

What is the Value of this Bill in Sterling Money? *Answ.* 922*l.* 8*s.* 6*d.* 2 *qrs.* $\frac{60}{420}$.

To know how much is gained or lost per Cent. *on the rising or falling of the Price of* Exchange.

EXAMPLES.

1. *London* draws upon *Holland* for any Sum of Money, Exchange at 35*s.* 6*d.* Flemish *per l.* Sterling: In three Weeks or one Month afterward, *London* draws on *Holland* again, Exchange at 34*s.* 6*d.* I demand what *London* gains *per Cent.* by this Negotiation? *Answ.* 2*l.* 17*s.* 11*d.* 2 *qrs.* $\frac{252}{414}$ *Gain.*

s.	*d.*		*s.*		*l.*	*l.*	*s.*	*d.*	
34	6	:	1	: :	100	: 2	17	11	2 *qrs.* $\frac{252}{414}$.

2. *London* draws upon *Amsterdam*, Exchange at 34*s.* 6*d.* Flemish *per l.* Sterling: And in five Weeks Time draws again, the Exchange being at 35*s.* 6*d.* how much is lost *per Cent.* by this Transaction? *Answ.* 2*l.* 17*s.* 11*d.* 2 *qrs.* $\frac{252}{414}$.

Note. Hence it is to be observed, that the lower the Price of Exchange is, the greater is the Gain at *London*; and the Contrary when it is higher: But the Case is just the Reverse in *Holland.*

CASE 8.

Q. *What Places does* London *exchange with by the Pound Sterling, or Pound Currency?*

A. In all the *British* Dominions in *America*, in the *West-Indies*, and in *Ireland.*

Q. *How do they keep their Accompts in these Places?*

A. As they do in *London*, that is, in Pounds, Shillings, Pence and Farthings; but with this Difference, that in *London* they call their Money Sterling, but in all the Western Dominions they call it Currency.

Q. *Why is the Money called* Currency *in the Western Dominions?*

A. Because they have very few Coins of any Sort circulating among them; excepting in the *English* Islands there; and therefore are obliged to deal in, what they call *Paper-Money.*

Note 1. *Notes* of Hand pass commonly among the People; and in *New-England* they are said to be given for so small a Sum as five Shillings. Now as this *Paper-Money* is subject to many Casualties, it causes a very great Undervaluement of their *Currency*, and is sometimes, and in some Places, at 6 or 700 Pounds Currency for 100 Pounds Sterling, or Money that is good Silver or Gold.

2. In all the *English* Islands in the *West-Indies*, they have so great a Plenty of foreign *Coins*, that their *Currency* is sometimes at no greater *Discount* than 25 *per Cent.* or 125*l.* Currency for 100*l.* Sterling, and seldom more than 50 *per Cent.*

3. The Weights and Measures in the *British Colonies* and *Plantations*, are the same as those in *London*, differing only in their Kintals or Hundred Weight; their Hundred being only 100*lb.* Avoirdupois, and that at *London* 112*lb.*

Q. *What*

Q. *What foreign Coins usually pass in the British Colonies and Plantations.*

A. These following: the Values of which were ascertained by an Act of Parliament made in the sixth Year of Queen *Ann.*

	Weight		True Va.			Cur. Value		
	dwt.	gr.	s.	d.		s.	d.	f.
Pieces of Eight (old Plate of *Seville*)	17	12	4	6		6	0	0
Ditto of new - -	14	0	3	7	$\frac{1}{4}$	4	9	2 $\frac{2}{3}$
Mexico ditto - - -	17	12	4	6		6	0	0
Pillar ditto - -	17	12	4	6	$\frac{2}{3}$	6	0	0
Peru ditto (old Plate) - -	17	12	4	5		5	10	2 $\frac{2}{3}$
Cross Dollars - - -	18	0	4	4	$\frac{3}{4}$	5	10	1 $\frac{1}{3}$
Ducatoons of *Flanders* - -	20	21	5	6		7	4	0
French Crowns or Ecues -	17	12	4	6		6	0	0
Crusadoes of *Portugal* - -	11	4	2	10	$\frac{1}{4}$	3	9	2 $\frac{2}{3}$
Three Guilder Pieces of *Holland*	20	7	5	2	$\frac{1}{4}$	6	10	3 $\frac{2}{3}$
Old Rix Dollars of the Empire -	18	10	4	6		6	0	0

Note 1. *Pieces* of the same *Weight*, and not of the same *Value*, may be presumed to be occasioned by the Difference of *Fineness*.

2. To remedy the Inconveniencies, which were caused by the different Rates at which Pieces of the same Species were current, it was ordered by Proclamation, and confirmed by the aforementioned Act of Parliament, that after the first day of *January*, 1704, no *Pillar*, *Mexico*, or *Seville Pieces* of *Eight*, tho' of full Weight as above, shall be received nor paid at above six Shillings a-piece; and the Halves, Quarters, and other lesser Pieces in Proportion. And the said *Act* enjoins, *That if any one shall receive or pay any of the said Pieces for any more than as above specified, such Person shall forfeit Ten Pounds.*

EXAMPLES.

1. A Merchant in *New-England* stands indebted to his Correspondent in *London*, in 4960*l.* 17*s.* 6*d.* Currency; what Sum must he answer for that at *London* aforesaid, when the Currency is at 300 *per Cent?* *Answ.* 1653*l.* 12*s.* 6*d.* *Sterling.*

2. My Correspondent in *Georgia* stands indebted to me for Merchandize, in the Sum of 120*l.* 6*s.* 9*d.* $\frac{1}{2}$ *Sterling*; how much is that in their Currency at 500 *per Cent?* *Answ.* 601*l.* 13*s.* 11*d.* $\frac{1}{2}$ *Currency.*

3. Trading to *Jamaica*, my Employer there owes me 176*l.* 12*s.* 8*d.* Sterling, how much is that in their Currency at 25 *per Cent.?* *Answ.* 220*l.* 15*s.* 10*d.* *Currency.*

4. I have lately purchased in *Ireland*, Effects to the Value of 400*l.* 17*s.* 9*d.* of that Place; what Sum must I answer for that at *London*, Exchange at 10 *per Cent?* *Answ.* 364*l.* 8*s.* 10*d.* 1 *qr.* $\frac{120}{264}$.

5. My Correspondent at *London*, draws upon me for 364*l.* 8*s.* 10*d.* $\frac{1}{2}$ Sterling; what Sum must I answer for that at *Dublin*, Exchange at 8 $\frac{1}{2}$ *per Cent.?* *Answ.* 395*l.* 8*s.* 5*d.* $\frac{1464}{9600}$.

CASE 9.

Q. *What Place does* London *Exchange with for their Crowns or Rix Dollars?*

A. With *Geneva* in *Switzerland.*

Q. *How do they keep their Accompts in* Geneva?

A. In *Livres*, *Sols*, and *Deniers.*

Note 1. 12 Deniers make 1 Sol.
20 Sols —— 1 Livre.
3 Livres —— 1 Rix Dollar.

2. The *Par* is, that one Rix-Dollar is equal to 4*s.* 6*d.* Sterling; but in Exchange it goes for 50*d.* to 60*d.* Sterling.

EXAMPLES.

1. *London* draws upon *Geneva* for 796*l.* 10*s.* 6*d.* Sterling; what Sum does that Amount to in Rix-Dollars, at 53*d.* *per* Dollar? *Answ.* 3606 $\frac{48}{53}$ *Rix. Dollars.*

2. A Merchant in *Geneva* draws upon his Correspondent at *London*, for 1960 Livres, Exchange at 56*d.* *per* Rix-Dollar; how much Sterling must be paid at *London* to answer that Bill? *Answ.* 152*l.* 8*s.* 10*d.* $\frac{1}{2}$.

$\frac{1960}{3} = 653\frac{1}{3}$ 1 : 56 : : $653\frac{1}{3}$: 152*l.* 8*s.* 10*d.* $\frac{1}{2}$. +

A Bill of Exchange, *viz.* *London* on *Geneva.*

London, October 19, 1790, for 376*l.* 11*s.* 8*d.* Sterling, to be paid in Rix-Dollars, at 58*d.* Sterling each, at Usance.

At Usance, pay this my only Bill of Exchange to Mr. *Jansen Gramonville*, or Order, Three Hundred Seventy-six Pounds, eleven Shillings and eight Pence, Sterling, in Rix-Dollars, at 58*d.* Sterling *per* Rix-Dollar, Value received, and place it to the Accompt of

Your humble Servant,
Jacobus Scomberg.

To Mr. *Abraham Schulhausen.*
Merchant in *Geneva.*

What is the Value of this Bill in Rix-Dollars? *Answ.* 1558 $\frac{16}{58}$ *Rix-Dollars.*

CASE 10.

Q. *What particular Piece of Money does* London *exchange with* Denmark *for?*

A. For *Rix-Dollars*; one being valued at about 4*s.* 6*d.* Sterling.

Q. *How do they keep their Accompts in* Denmark?

A. In Marks and Shillings.

Note 1. 16 Shillings make 1 Mark.
6 Marks —— 1 Rix-Dollar.

2. The Rix-Dollar, in Exchange, goes for 45*d.* to 58*d.* Sterling.

EXAMPLES.

1. *London* draws on *Copenhagen* in *Denmark* for 184*l.* 16*s.* 7*d.* Sterling: what Sum must be answered for that in Rix-Dollars at 50*d.* each? *Answ.* 887 $\frac{9}{50}$ *Dollars.*

2. My

2. My Correspondent in *London*, stands indebted to me, according to my Books, in the Sum of 1000 Rix-Dollars, what Sum must he answer for that at *London* aforesaid, when the Rix-Dollar, by way of Exchange, is valued at 58*d.* $\frac{1}{2}$? *Answ.* 243*l.* 15*s.*

3. A Merchant in *London* draws upon his Correspondent in *Copenhagen*, for 400*l.* Sterling, but will give no more for a Rix-Dollar than 55*d.* Sterling, that being the Price of Exchange; how many Rix-Dollars must he receive, and what is his whole Loss, and the Loss *per Cent.* they being above Par? *Answ.* 1745 $\frac{25}{55}$ *Rix-Dollars; The whole Loss was* 7*l.* 5*s.* 3*d. and the Loss per Cent. was* 1*l.* 16*s.* 3*d.* $\frac{3}{4}$.

d. Dol. l. Dol.

55 : 1 : : 400 : 1745 $\frac{25}{55}$.

1745$\frac{1}{2}$ at 4*s.* 6*d.* = 392*l.* 14*s.* 9*d. at Par.*

400*l.*—392*l.* 14*s.* 9*d.* = 7*l.* 5*s.* 3*d. Loss.*

$\frac{253}{4}$ = 1*l.* 16*s.* 3*d.*$\frac{3}{4}$ *Loss per Cent.*

CASE II.

Q. *What Place does* London *exchange with for the Copper-Dollar?*

A. With *Stockholm* in *Sweden.*

Q. *How do they keep their Accompts in* Stockholm?

A. In Rix-Dollars, Copper-Dollars, and Runstics.

Note 1. 32 Runstics make 1 Copper-Dollar.
6 Copper-Dollars 1 Rix-Dollar.

2. The Par of the Rix-Dollar is equal to about 6*s.* Sterling; consequently the Par of the Copper-Dollar is equal to 1*s.* Sterling, or 20 Copper Dollars make 1*l.* Sterling, tho' the Course of Exchange is sometimes to 28 or 30 Copper-Dollars per *l.* Sterling.

3. In *England* Sums of Money are paid in the best Specie, *viz.* Guineas, by which Means 1000*l.* or more, may be put into a small Bag, and conveyed away in the Pocket: But in *Sweden* they often pay sums of Money in Copper, and the Merchant is obliged to send Wheelbarrows, instead of Bags, to receive it.

EXAMPLES.

1. A Merchant in *Stockholm* draws upon his Correspondent in *London*, for 1184 Rix-Dollars; what Sum must he answer for that in *London* aforesaid, when the Course of Exchange is at Par? *Answ.* 355*l.* 4*s.*

2. *Stockholm* draws upon *London* for 1276 Rix-Dollars: what Sum must *London* answer for that, Exchange at 25 Copper-Dollars *per l.* Sterling, and what is gained or lost by the Drawer at *Stockholm* aforesaid? *Answ.* 306*l.* 4*s.* 9*d.* 2*qrs.* $\frac{2}{5}$ *the Bill, and the Drawer loses* 76*l.* 11*s.* 2*d.* 1 *qr.* $\frac{3}{5}$.

35 : 1 : : 1276×6 : 306 4 9 2$\frac{2}{5}$, *the Value of the Bill.*

25 : 5 : : 7756 : 76 11 2 1$\frac{3}{5}$, *Loss.*

Having

Having given several Bills of Exchange to be reduced into Sterling or Foreign Money; it may not be amiss to give the Form how a Bill Book should be kept, that a Merchant may know at Sight what Bills he has to pay, and what to receive, and when to pay and receive them.

1. Bills Payable, *i. e.* such as you have Accepted.

The Drawer's Name and Place of Residence.	Date of the Bill.	The Time of Payment.	Payable to whom or Order.	The Sum drawn for	Price of Exchange.	For or by whom accepted, and Place of Abode.	The Sum Sterling.	When due.	Paid or refused Acceptance.
Will. Sherston, of *Venice*	17 *Aug.*	3 Months.	*Abraham Jennings.*	*Ducats* B. 4000	*Sterling.* 54*d.* $\frac{1}{4}$.	*William Denny, Rood-lane.*	*l. s. d.* 904 3 4	15 *Nov.*	Paid.

2. Bills receivable, *i. e.* such as you have in your Possession.

The Drawer's Name and Place of Residence.	Date of the Bill	The Time of Payment.	Payable to whom or Order.	The Sum drawn for.	Price of Exchange.	For or by whom accepted, and Place of Abode.	The Sum Sterling.	When due.	Received, or returned protested for Non-Acceptance, or Non-Payment.
Mich. Tassioni, Florence.	19 *Oct.*	3 Months.	*James Edwards.*	Ecues 1876.	*Sterling.* 63*d.*		*l. s.* 492 10	17 *Jan.*	Protested for Non-Acceptance.

CASE

CASE 12.

Of the Comparison of WEIGHTS *and* MEASURES.

EXAMPLES.

1. If 112 *lb.* at *London* make 99 *lb.* at *Lisbon*; how many *lb.* at *London* are equal to 1049 *lb.* at *Lisbon*? *Answ.* 1186 *lb.* $\frac{74}{99}$.

2. If 112 *lb.* at *London* make 98 *lb.* at *Roan*; how many *lb.* at *Roan* are equal to 1000 *lb.* at *London*? *Answ.* 875 *lb.*

3. If 100 Ells *English* make 108 Braces at *Venice*; how many Ells *English* are equal to 1000 Braces at *Venice*? *Answ.* 925 *Ells* $\frac{100}{108}$.

4. If 100 Ells at *London* make 145 Ells at *Vienna*; how many Ells at *Vienna* are equal to 10 *Ells* at *London*? *Answ.* 14 *Ells* $\frac{1}{2}$.

Note. Hence appears the Reason of those *Rules* laid down in *Conjoined Proportion*, for placing the last Number in the Question either on the *right Hand*, or the *left*, as the Nature of the Question requires.

lb. Lis. lb. Lon. lb. Lis.
Ex. 1. 99 : 112 : : 1049
lb. lb.
112 = 99
1049

lb. Lon. lb. R. lb. Lon.
Ex. 2. 112 : 98 : : 1000
lb. lb.
112 = 98
1000

Of the DOUBLE RULE *of* THREE.

Q. BY *what is the* Double Rule *of* Three *known?*

A. By five Terms which are always given in the Question to find a sixth.

Q. *In what Proportion is the sixth Term to be found?*

A. If the Proportion is *Direct* the *Sixth Term* must bear such a Proportion to the *Fourth* and *Fifth*, as the *Third* bears to the *First* and *Second*: But if the Proportion is *Inverse*, then the *Sixth Term* must bear such Proportion to the *Fourth* and *Fifth*, as the *First* bears to the *Second* and *Third*, or as the *Second* bears to the *First* and *Third*.

Note. *It is to be observed here, as in the* Single Rule *of Three, that* Direct Proportion *is when* more requires more, *or* less requires less; *and* Inverse Proportion *is when* more requires less, *or* less requires more.

Q. *What*

Q. *What do you observe concerning the* Five *given* Terms?

A. That the *three First Terms* are a Supposition; the *two last* are a Demand.

Q. *How must the Numbers given in the* Questions *be stated?*

A. By two *Single Rules* of *Three: Or otherwise thus;*

1. Let the Principal Cause of *Loss* or *Gain*, *Interest* or *Decrease*, *Action* or *Passion*, be put in the *first Place.*

2. Let that which betokeneth *Time*, *Distance of Place*, and the like, be put in the *second Place;* aud the remaining one in the *third Place.*

3. Place the other *two Terms* under their like in the Supposition.

4. If the *Blank* falls under the *third Term*, multiply the *first* and *second Terms* for a *Divisor*, and the other *Three* for a *Dividend.*

5. If the *Blank* falls under the *first* or *second Term*, multiply the *third* and *fourth Terms* for a *Divisor*, and the other *Three* for a *Dividend;* and the *Quotient* will be the Answer.

Q. *How are the following Questions proved?*

A. Let them be varied; or else work the same Questions by two *Single Rules* of *Three.*

EXAMPLES.

1. If 7 Men can reap 84 Acres of Wheat in 12 Days; how many Men can reap 100 Acres in 5 Days? *Answ.* 20 *Men.*

2. If 7 *Qrs.* of Malt are sufficient for a Family of 7 Persons for 4 Months; how many *Qrs.* are enough for 46 Persons 10 Months? *Answ.* 115 *Qrs.*

3. If 8 Reapers have 3*l.* 4*s.* for 4 Days Work; how much will 48 Men have for 16 Days Work? *Answ.* 76*l.* 16*s.*

4. If 10 Bushels of Oats be enough for 18 Horses 20 Days; how many Bushels will serve 60 Horses 36 Days? *Answ.* 60 *Bush.*

5. If a Footman travels 240 Miles in 12 Days, when the Days are 12 Hours long; how many Days may he travel 720 Miles in, of 16 Hours long? *Answ.* 27 *Days.*

6. If 56 *lb.* of Bread will be sufficient for 7 Men 14 Days; how much Bread will serve 21 Men 3 Days? *Answ.* 36 *lb.*

7. If 700*l.* in half a Year raise 14*l.* Interest; how much will 400*l.* raise in 5 Years? *Answ.* 80*l.*

8. If 30*s.* be the Hire of 8 Men for 3 Days; how many Days must 20 Men work for 15*l.*? *Answ.* 12 *Days.*

9. If 4 Reapers have 24*s.* for 3 Days Work; how many Men will earn 4*l.* 16*s.* in 16 Days? *Answ.* 3 *Men.*

10. A

10. An Usurer put out 86*l.* to receive Interest for the same; and when it had continued 8 Months, he received for Principal and Interest 88*l.* 17*s.* 4*d.* I demand at what Rate *per Cent. per Annum* he received Interest? *Ans.* 5*l.* *per Cent.*

11. What is the Interest of 200*l.* for 3 Years and $\frac{3}{4}$, at 5 *per Cent. per Annum?* *Ans.* 37*l.* 10*s.*

12. What is the Interest of 400*l.* for a Week, at 5 *per Cent. per Annum?* *Ans.* 7*s.* 8*d* 1*qr.* $\frac{12}{52}$.

13. What is the Interest of 120*l.* for 126 Days, at 4 *per Cent. per Annum?* *Ans.* 1*l.* 13*s.* 1*d.* 2 *qr.* $\frac{258}{363}$.

Note. The *Rule* for working Questions in *Simple Interest* for *Days*, p. 67, is taken from this *Rule*, as appears by this last Example.

Of CONJOINED PROPORTION.

Q. *What is* Conjoined Proportion?

A. Conjoined Proportion is when the *Coins*, *Weights*, or *Measures* of several Countries are compared in the same Question; or it is a linking together of many *Proportions*.

CASE I.

Q. *How are Questions answered in this* Case?

A. When it is required to know how many of the *first* Sort of *Coin*, *Weight* or *Measure*, mentioned in the *Question*, are equal to a given Number of the last; then

1. Place the Numbers alternately, beginning at the *left Hand*, and let the last Number stand on the left Hand.

2. Multiply the first Rank continually for a Dividend, and the second for a Divisor.

Note. See the *Note* in Comparison of Weights and Measures, p. 91, for the Reason of this *Rule*.

Q. *How is* Conjoined Proportion *proved?*

A. Make as many *Single Rules* of *Three* as the Nature of the Question requires.

EXAMPLES.

1. If 100 *lb. English* make 95 *lb. Flemish:* and 19 *lb. Flemish* 25 *lb.* at *Bolonia;* how many *lb. English* are equal to 50 *lb.* at *Bolonia?* *Answ.* 40 *lb. English.*

2. If 25 *lb.* at *London* be 22 *lb.* at *Nurenburg;* 88 *lb.* at *Nurenburg* 92 *lb.* at *Hamburg;* 46 *lb.* at *Hamburg* 49 *lb.* at *Lyons*, how many *lb.* at *London* are equal to 98 *lb.* at *Lyons?* *Answ.* 100 *lb.*

3. If 6 Braces at *Leghorn* make 3 Ells *English;* 5 Ells *English* 9 Braces at *Venice;* how many Braces at *Leghorn* will make 45 Braces at *Venice?* *Answ.* 50 *Braces at* Leghorn.

4. If three Ells *English* make 6 Braces at *Leghorn;* and 150 Braces at *Leghorn* 135 Braces at *Venice;* how many Ells *English* are equal to 27 Braces at *Venice?* *Answ.* 15 *Ells* English.

CASE 2.

Q. *How are Questions answered in this* Case?

A. When it is required to know how many of the *last* Sort of *Coin, Weight,* or *Measure,* mentioned in the *Question* are equal to a given Number of the *first;* then

1. Place the Numbers alternately, as in *Case* 1, but let the last Number stand on the *right Hand.*

2. Multiply the *second Rank* for a Dividend, and the *first* for a Divisor.

EXAMPLES.

1. If 10*lb.* at *London* make 9*lb.* at *Amsterdam;* 90*lb.* at *Amsterdam* 112*lb.* at *Thoulouse;* how many *lb.* at *Thoulouse* are equal to 50*lb.* at *London?* *Answ.* 56*lb.* *at* Thoulouse.

2. If 20 Braces at *Leghorn* be equal to 10 Vares at *Lisbon;* 40 Vares at *Lisbon* to 80 Braces at *Lucca;* how many Braces at *Lucca* are equal to 100 Braces at *Leghorn?* *Answ.* 100 *Braces at* Lucca.

Of ALLIGATION.

Q. HOW *many Kinds of* Alligation *are* there?

A. Two; *Alligation Medial,* and *Alligation Alternate.*

Of ALLIGATION MEDIAL.

Q. *What is* Alligation Medial?

A. *Alligation Medial* is when the Quantities and Prices of several Things are given to find the mean Price of the Mixture compounded of those Things.

Q. *What is the* Rule?

A. As the *whole Composition*
Is to its *Total Value:*
So is any *Part* of the *Composition*
To its *mean Price.*

Q. *How*

Q. *How is* Alligation Medial *proved?*

A. Find the Value of the whole Mixture at the *mean Rate;* and if it agrees with the Total Value of the several Quantities at their respective Rates, the Work is right.

EXAMPLES.

1. A Farmer mingled 19 Bushels of Wheat at 6*s.* *per* Bushel, and 40 Bushels of Rye, at 4*s.* *per* Bushel, and 12 Bushels of Barly, at 3*s.* *per* Bushel, together; I demand what a Bushel of this Mixture is worth? *Answ.* 4*s.* 4*d.* 1*qr.* $\frac{41}{71}$.

2. A Farmer mingled 20 Bushels of Oats, at 2*s.* *per* Bushel, and 30 Bushels of Beans, at 2*s.* *per* Bushel, and 20 Bushels of Peas, at 3*s.* *per* Bushel, together; I demand the Worth of a Bushel of this Mixture? *Answ.* 2*s.* 3*d.* 1*qr.* $\frac{5}{7}$.

3. A Vintner mingled 5 Gallons of Canary, at 8*s.* *per* Gallon, and 6 Gallons of Malaga, at 7*s.* *per* Gallon, and 4 Gallons of white Wine, at 6*s.* *per* Gallon, together; I demand what a Gallon of this Mixture is worth? *Answ.* 7*s.* 0*d.* 3*qrs.* $\frac{1}{5}$.

4. A Grocer mingled 2 *C.* of Sugar at 56*s.* *per C.* and 1 *C.* at 43*s.* *per C.* and 2 *C.* at 50*s.* *per C.* together; I demand the Price of 3 *C.* of this Mixture? *Answ.* 7*l.* 13*s.*

5. An Alehouse keeper mixed 3 Sorts of Ale together, *viz.* 12 Gallons, at 6*d.* *per* Gallon, 16 Gallons, at 7*d.* *per* Gallon, and 21 Gallons, at 9*d.* *per* Gallon; I demand what 1 Gallon of this Mixture is worth? *Answ.* 7*d.* 2 *qrs.* $\frac{22}{49}$.

6. A Refiner having 5 *lb.* of Silver Bullion, at 8 *oz.* fine, 10 *lb.* of 7 *oz.* fine, and 15 *lb.* of 6 *oz.* fine, would melt all together; I demand what fineness 1 *lb.* of this Mass shall be? *Answ.* 6 *oz.* 13 *dwts.* 8 *grs. fine.*

7. A Mint-Master hath 3 *lb.* Weight of Gold, of 22 Carrats fine, and 3 *lb.* of 20 Carrats fine; I demand what Fineness an *oz.* of this Mixture will bear? *Answ.* 21 *Carrats fine.*

8. An Hostler mixing Provender for his Horses, would put in a Quantity of Beans, at 5*s.* *per* Bushel, with the like Quantity of Oats, at 3*s.* 6*d.* *per* Bushel; I demand the Price of a Bushel of this Mixture? *Answ.* 4*s.* 3*d.*

9. A Maltster hath several Sorts of Malt, *viz.* one Sort at 4*s.* 6*d.* another at 4*s.* and a third at 3*s.* 6*d.* *per* Bushel, and he would mix an equal Quantity of each together; I demand the Price of a Bushel of this Mixture? *Answ.* 4*s.*

10. A Brewer had several Sorts of Ale, *viz.* one Sort at 20*s.* *per* Barrel; another at 25*s.* and a third at 30*s.* and a fourth at 35*s.* *per Barrel*; and he would mix an equal Quantity of each together; I demand the Price of a Barrel, and also of a Gallon of this Mixture? *Answ.* 27*s.* 6*d.* *per Barrel, and* 10*d.* 1 *qr.* $\frac{8}{31}$. *per Gallon.*

Of ALLIGATION ALTERNATE.

Q. *What is* Alligation Alternate?

A. Alligation Alternate is, when the Rates of several Things are given to find such Quantities of them, as are necessary to make a *Mixture*, which may bear a certain Rate propounded.

Q. *How are the Rates or Prices of the given Things to be ordered?*

A. 1. They must be placed one over the other, and the propounded *Price* of the *Composition* against them; thus,

Mean Rate 7 } 4 *Prices* 5 *of the* 6 *Sim-* 8 *ples.*

2. Link the several *Rates* together, in such Sort, that one *greater* than the *mean Rate* may be coupled to another which is *less.*

3. Take the *Differences* between the *mean Rate*, and the several Prices, and place them each against his Yoke-fellow: And for the rest, observe the following *Cases.*

CASE I.

Q. *What do you observe in this first* Case?

A. When the *Prices* of the several *Things* together with the *mean Rate* of the *Mixture* are given, without any *Quantity*, to find how much of each *Ingredient* is required to compose the *Mixture*; take the *Difference* between each *Price*, and the *mean Rate*, and set them alternately, and they will be the Quantities required.

Q. *How are the Operations in* this *and the following* Cases *proved?*

A. They are all proved by *Alligation Medial.*

EXAMPLES.

1. How much Rye at 4*s.* *per* Bushel, Barly at 3*s.* *per* Bushel, and Oats at 2*s.* *per* Bushel, will make a Mixture worth 2*s* 6*d.* *per* Bushel? *Answ.* 6 *Bushels of Rye,* 6 *Bushels of Barly, and* 24 *Bushels of Oats.*

2. How

2 How many Raisins of the Sun, at 7*d. per lb.* and Malaga Raisins at 4*d. per lb.* may be mixed together for 6*d. per lb.*

Answ. 2*lb. of Raisins of the Sun, and* 1 *lb. of Malaga Raisins.*

Note. Questions in this Rule do frequently admit of an infinite Variety of *Answers*, and all in *whole Numbers*; as in this last *Example*; where though 2 and 1 do answer the *Question*, yet any other *two Numbers* will as truly do the like, that are in the same Proportion.

For 2 : 1 : : { 4 : 2, 6 : 3, 8 : 4, 16 : 8, 40 : 20, &c. *without End.*

3. A Grocer would mix three Sorts of Sugar together, *viz.* one Sort at 10*d. per lb* another at 7*d.* and another at 6*d.* how much of each Sort must he take, that the whole Mixture may be sold for 8*d. per lb?*

lb. d. lb. d. lb. d.

Answ. 3 *at* 10; 2 *at* 7, *and* 2 *at* 6 *per lb.*

4. A Maltster hath several Sorts of Malt, *viz.* one Sort at 4*s. per* Bushel, another at 3*s.* 6*d.* a third at 3*s.* and a fourth at 2*s. per* Bushel; and he is desirous to mix so much of each Sort together, that the Whole may be sold at 2*s.* 6*d. per* Bushel; I demand how much he must take of each Sort?

Bush. s. B. s. d. B. s. B. s.

Answ. 6 *at* 4; 6 *at* 3 6; 6 *at* 3, *and* 36 *at* 2 *per Bush.*

5 A Druggist hath several Sorts of Tea, *viz.* one Sort at 12*s. per lb.* another at 11*s* a third at 9*s* and a fourth at 8*s. per lb.* I demand how much of each Sort he must mix together, that the whole Quantity may be afforded at 10*s. per lb.?*

	lb.	*s.p.lb.*		*lb.*	*s.p.lb.*		*lb.*	*s.p.lb.*
1 *Answ.*	2 *at*	12	2 *Answ.*	3 *at*	12	3 *Answ.*	1 *at*	12
	1 *at*	11		2 *at*	11		2 *at*	11
	1 *at*	9		2 *at*	9		2 *at*	9
	2 *at*	8		3 *at*	8		1 *at*	8

	lb.	*s.p.lb.*		*lb.*	*s.p. lb.*		*lb.*	*s.p.lb.*
4 *Answ.*	1 *at*	12	5 *Answ.*	3 *at*	12	6 *Answ.*	2 *at*	12
	3 *at*	11		1 *at*	11		3 *at*	11
	3 *at*	9		3 *at*	9		1 *at*	9
	1 *at*	8		2 *at*	8		3 *at*	8

7 *Answ.* 3 *lb. of each Sort.*

Note. These *seven Answers* arise from as many different Ways of linking the *Rates* of the Simples together.

6. How

6. How much Alloy must I mix with Bullion of 10 *oz.* fine to abase the same to 8 *oz.* fine? *Answ. To every* 8 *oz. of Bullion of* 10 *oz. fine, put* 2 *oz. of Alloy, and that will abase it to* 8 *oz. fine.*

CASE 2.

Of Alternation Partial.

Q. *What do you observe in this second* Case?

A. When the *Rate* of all the *Things*, the *Quantity* of but one of them, and the *mean Rate* of the whole *Mixture* are given to find the several *Quantities* of the rest, in Proportion to the *Quantity* given; take the *Differences* between each *Price*, and the *mean Rate*, and place them alternately, as in *Case* 1. Then say,

As the *Difference* of the same *Name* with the *Quantity* given
Is to the rest of the *Differences* severally:
So is the *Quantity* given
To the several *Quantities* required.

EXAMPLES.

1. A Man being determined to mix 10 Bushels of Wheat at 4*s.* *per* Bushel, with Rye at 3*s.* with Barly at 2*s.* and with Oats at 1*s.* *per* Bushel; I demand how much Rye, Barly, and Oats must be mixed with the 10 Bushels of Wheat, that the Whole may be sold for 28*d.* *per* Bushel?

	B.	p.	
1 *Answ.*	2	2	*of Rye*
	5	0	*of Barly*
	12	2	*of Oats*

	B.	
2 *Answ.*	40	*of Rye*
	50	*of Barly*
	20	*of Oats*

	B.	
3 *Answ.*	8	*of Rye*
	10	*of Barly*
	14	*of Oats*

	B.	
4 *Answ.*	10	*of Rye*
	14	*of Barly*
	14	*of Oats*

	B.	p.	
5 *Answ.*	12	2	*of Rye*
	5	0	*of Barly*
	17	2	*of Oats*

	B.	
6 *Answ.*	2	*of Rye*
	14	*of Barly*
	10	*of Oats*

	B.	
7 *Answ.*	50	*of Rye*
	70	*of Barly*
	20	*of Oats.*

2. A man being determined to mix 12 Bushels of Oats, at 18*d.* *per* Bushel, with Barly at 2*s.* 6*d.* with Rye at 3*s.* and with Wheat at 4*s.* *per* Bushel; I demand how much Barly, Rye, and Wheat, must be mixed with the 12 Bushels of Oats, that

that it may bear the Price of 22*d.* *per* Bushel? *Answ.* 1 *Bush. of each Sort.*

3. A Man being determined to mix 12 Bushels of Oats, at 18*d.* *per* Bushel, with Barly at 2*s.* 6*d.* with Rye at 3*s.* and with Wheat at 4*s.* *per* Bushel; I demand how much Barly, Rye, and Wheat, must be mixed with the 12 Bushels of Oats, that the whole may bear the Price of 2*s.* 9*d.* *per* Bushel?

	B.		B. p.
1 *Answ.*	60 *of Barly*	2 *Answ.*	2 1 $\frac{9}{13}$ *of Barly*
	60 *of Rye*		2 1 $\frac{9}{13}$ *of Rye*
	12 *of Wheat*		12 0 *of Wheat*
	B.		B.
3 *Answ.*	10 *of Barly*	4 *Answ.*	72 *of Barly*
	10 *of Rye*		72 *of Rye*
	12 *of Wheat*		12 *of Wheat*
	B.		B. p.
5 *Answ.*	2 *of Barly*	6 *Answ.*	14 1 $\frac{9}{13}$ *of Barly*
	12 *of Rye*		2 1 $\frac{9}{13}$ *of Rye*
	10 *of Wheat*		14 1 $\frac{9}{13}$ *of Wheat*

7 *Answ.* 12 *Bushels of each Sort.*

4. A Man being determined to mix 12 Bushels of Oats, at 18*d.* *per* Bushel, with Barly at 2*s.* 6*d.* with Rye at 3*s.* and with Wheat at 4*s.* *per* Bushel; I demand how much Barly, Rye, and Wheat, must be mixed with the 12 Bushels of Oats, that the whole Quantity may bear the Price of 3*s.* 6*d.* *per* Bushel.

	B.
Answ.	12 *of Barly*
	12 *of Rye*
	84 *of Wheat*

5. A Man intends to mix 28 Bushels of Oats, at 18*d.* *per* Bushel, with Barly at 2*s.* 6*d.* with Rye at 3*s.* and with Wheat at 4*s.* I would know how much Barly, Rye, and Wheat, ought to be added to the 28 Bushels of Oats, that the whole Quantity may be afforded at 2*s.* *per* Bushel? *Answ.* 4 *Bushels of each Sort.*

6. A Farmer would mix 27 Bushels of Pease at 18*d.* *per* Bushel, with Oats at 28*d.* and with Beans at 30*d.* *per* Bushel, that the whole Quantity may bear the Price of 20*d.* *per* Bushel, I demand how much Oats and Beans must be mixed with the 27 Bushels of Pease? *Answ.* 3 *Bushels of each Sort.*

CASE

CASE 3.

Of Alternation Total.

Q. *What do you observe in this third* Case?

A. When the *Rates* of the several *Things*, the *Quantity* to be compounded and the *mean Rate* of the whole *Mixture* are given, to find how much of each Sort will make up the *Quantity*; place the *Difference* between the several *Prices*, and the *mean Rate* alternately, as in *Case* 1. Then say,

As the *Sum* of the *Differences*
Is to the *whole Composition*:
So is the *Difference* of each *Rate*
To the *Quantity* of the same *Rate*.

EXAMPLES.

1. A Grocer hath 4 Sorts of Sugar, *viz* at 8*d. per lb.* at 6*d. per lb.* at 4*d. per lb* and at 2*d. per lb.* and he would have a Composition of an *C. wt.* worth 5*d. per lb.* I demand how much of each Sort he must take?

1 *Answ.*

lb.	*d.p.lb.*
42	*at* 8
14	*at* 6
14	*at* 4
42	*at* 2
112	

2 *Answ.*

lb.	*d.p.lb.*
14	*at* 8
42	*at* 6
42	*at* 4
14	*at* 2
112	

3 *Answ.*

lb.	*oz.*	*dr.*	*d.p.lb.*
28	0	0	*at* 8
37	5	5 $\frac{4}{12}$	*at* 6
9	5	5 $\frac{4}{12}$	*at* 4
37	5	5 $\frac{4}{12}$	*at* 2
112	0	0	

4 *Answ.*

lb.	*oz.*	*dr.*	*d.p.lb.*
37	5	5 $\frac{4}{12}$	*at* 8
9	5	5 $\frac{4}{12}$	*at* 6
37	5	5 $\frac{4}{12}$	*at* 4
28	0	0	*at* 2
112	0	0	

5 *Answ.*

lb.	*oz.*	*dr.*	*d.p.lb.*
11	3	3 $\frac{2}{10}$	*at* 8
44	12	12 $\frac{8}{10}$	*at* 6
44	12	12 $\frac{8}{10}$	*at* 4
11	3	3 $\frac{12}{10}$	*at* 2
112	0	0	

6 *Ans.*

lb.	*d.p.lb.*
32	*at* 8
24	*at* 6
24	*at* 4
32	*at* 2
112	

7 *Answ.* 28 *lb. of each Sort.*

2. A

2. A Vintner hath 4 Sorts of Wine, *viz.* Canary at 10*s.* *per* Gallon, Malaga at 8*s.* Rhenish at 6*s.* and Oporto at 4*s.* and he is minded to make a Composition of 60 Gallons, worth 9*s.* *per* Gallon; I demand how much of each Sort he must have? *Answ.* 45 *Galls. Canary, and* 5 *Galls. of each other Sort.*

3. Brewer hath 3 Sorts of Ale, *viz.* at 10*d.* at 8*d.* and at 6*d.* *per* Gallon; and he would have a Composition of 30 Gallons, worth 7*d.* *per* Gallon; I demand how much of each Sort he must have?

	Gals.		*d. per Gallon.*
	5	*at*	10
	5	*at*	8
Answ.	20	*at*	6
	—		
	30		
	—		

4. A Goldsmith hath several Sorts of Gold, *viz.* some of 24 Carrats fine, some of 22 Carrats, and some of 18 Carrats fine; and he would have compounded of these Sorts the Quantity of 60 *oz.* of 20 Carrats fine? I demand how much of each Sort he must take?

	Oz.			
	12	*at*	24	*Carrats fine.*
	12	*at*	22	*Carrats fine.*
Answ.	36	*at*	18	*Carrats fine.*
	—			
	60			
	—			

5. A Goldsmith hath Gold of three Sorts, *viz.* of 22 Carrats, of 21 Carrats, and of 20 Carrats fine, and he would mix with these so much Alloy, as that the Quantity of 21 *oz.* may bear 18 Carrats fine; I demand how much of each Sort he must take and how much Alloy? *Answ.* 6 *oz. of each Sort of* Gold, *and* 3 *oz. of* Alloy.

6. A Druggist had three Sorts of Drugs, one was worth 4*s.* *per lb.* another 5*s.* and another 8*s.* and out of these he made two Parcels, one was 21*lb.* at 6*s.* *per lb.* and the other 35*lb.* at 7*s.* *per lb.* how much of every Sort did he take for each Parcel?

	lb.		*s. per lb.*	*lb.*		*s. per lb.*
	6	*at*	4	5	*at*	4
	6	*at*	5	5	*at*	5
Answ.	9	*at*	8	25	*at*	8
	—			—		
	21	*at*	6*s. per lb.*	35	*at*	7*s. per lb.*
	—			—		

Of POSITION.

Q. WHAT *is* Position *or* Negative Arithmetic:

A. It discovers the Truth by supposed Numbers.

Q. *How many Kinds of* Position *are there?*

A. Two: *Single* and *Double.*

Of SINGLE POSITION.

Q. *What is* Single Position?

A. It discovers the Truth by only *one* supposed Number.

Q. *How is that supposed* Number *used?*

A. By working with it as if it was the true Number, in the same Proportion as the Question directs; and if the Result be either too much, or too little, the true Number may be found out by the following Rule, *viz.*

As the *Result of the Position*
Is to the *Position:*
So is the given *Number*
To the *Number* required.

Q. *How do you prove* Position?

A. Position, both *Single* and *Double*, is proved by adding the several *Sums* required, or the several *Parts* of the *Sum* required together; and if that *Sum* agrees with the given *Sum*, it is right.

EXAMPLES.

1. Two Men, *A* and *B*, having found a Bag of Money, disputed who should have it; *A* said the half, third, and fourth of the Money made 130*l.* and if *B* could tell how much was in it, he should have it all, otherwise he should have nothing; I demand how much was in the Bag? *Answ.* 120*l.*

2. *A*, *B*, and *C*, determining to buy together a certain Quantity of Timber, worth 36*l.* agree that *B* shall pay $\frac{1}{3}$ more than *A*, and *C* $\frac{1}{4}$ more than *B*; I demand how much each Man must pay? *Answ. A* 9*l. B* 12*l. C* 15*l.*

3. A Person having about him a certain Number of Crowns, said if the half, third, and fourth of them were added together, they would make 65 Crowns; I demand how many he had? *Answ.* 60 *Crowns.*

4. *A* lent *B* a Sum of Money, to be paid at 4 Payments; when 3 of them were made, and *A* come to demand the fourth, *B* would give him no more, except he would tell him how much was paid already; *A* said the first Payment was a fourth; the second, a fifth; and the third, a sixth of the Sum first lent; and all together made 74*l.* I demand the Sum lent? *Answ.* 120*l.*

5. One

5. One Man carrying a Bag of Money in his Hand, another asked him, how much was in it: He answered, he could not tell, but the third, fourth, and fifth of it made 94*l.* How much was in the Bag? *Answ.* 120*l.*

6. I have delivered to a Banker a certain Sum of Money, to receive of him after the Rate of 6*l.* *per Cent. per Annum;* and at the End of ten Years he paid me 500*l.* for Principal and Interest together; I demand the Sum delivered to him at first; *Answ.* 312*l.* 10*s.*

Of DOUBLE POSITION.

Q. *What is* Double Position?

A. It is that which discovers the true Number sought, by making use of *two* supposed Numbers.

Q. *How are those supposed Numbers used?*

A. 1. By working with them as if they were the true Numbers, in the same Proportion as the Question directs.

2. The *Results* or *Errors* must be placed against their *Positions* or supposed Numbers; thus:

Pos.	*Er.*
40	28
36	19

3. Multiply them *Cross-wise.*

4. If the *Errors* are *alike; i. e.* both greater, or both less than the given Number, take their *Differences*, for a *Divisor*, and the *Difference* of the *Products* for a *Dividend.*

5. If the *Errors* are *unlike*, take their *Sum* for a *Divisor*, and the *Sum* of the *Products* for a *Dividend;* the *Quotient*, thence arising will be the *Answer.*

EXAMPLES.

1. *A*, *B*, and *C*, would divide 100*l.* between them, so as that *B* may have 3*l.* more than *A*, and *C* 4*l.* more than *B*, I demand how much each Man must have? *Answ.* *A* 30*l.* *B* 33*l.* *C* 37*l.*

2. A Man lying at the Point of Death, said, He had in a certain Coffer 100*l.* which he bequeathed to 3 of his Friends, after this Manner: The first must have a certain Portion; the second must have twice as much as the first, wanting 8*l* and the third must have three times as much as the first, wanting 15*l.* I demand how much must each Man have? *Answ.* *The First* 20*l.* 10*s.* *Second* 33*l.* *Third* 46*l.* 10*s.*

3. *A*, *B*, and *C*, built an House which cost 100*l.* of which *A* paid a certain Sum; *B* paid 10*l.* more than *A;* and *C* paid as much as *A* and *B;* I demand each Man's Share in that Charge? *Answ.* *A paid* 20*l.* *B* 30*l.* *C* 50*l.*

4. Three

4. Three Persons discoursed together concerning their Ages; says *A*, I am 20 Years of Age; says *B*, I am as old as *A*, and half *C*; and says *C*. I am as old as you both: I demand the Age of each Person? *Answ. A was* 20, *B* 60, *C* 80 *Years of Age.*

5. A Man lying at the Point of Death, left to his 3 Sons all his Estate in Money, *viz.* to *F* half wanting 50*l.* to *G* one third; and to *H* the rest, which was 10*l.* less than the Share of *G*; I demand the Sum left, and each Man's Part? *Answ. The Sum left was* 360*l. whereof F had* 130*l. G* 120*l. H* 110*l.*

6. A certain Man having drove his Swine to the Market, *viz.* Hogs, Sows, and Pigs, received for them all 50*l.* being paid for every Hog 18*s.* for every Sow 16*s.* for every Pig 2*s.* there were as many Hogs as Sows, and for every Sow there were three Pigs; I demand how many there were of each Sort? *Answ.* 25 *Hogs*, 25 *Sows*, 75 *Pigs.*

7. A surly old Fellow being demanded the Ages of his four Children, answered, You may go and look: But if you must needs know; my first Son was born just one Year after I was married to his Mother, who, after his birth, lived 5 Years, and then died in Child-bed with my second Son: 4 Years after that I married again, and within two Years had my third and fourth Sons at a Birth, the Sum of whose two Ages is now equal to that of the Eldest; I demand their several Ages. *Answ. The first* Son *was* 22 *Years old, the second* 17, *the third* 11 *and the fourth* 11 *Years old.*

Of COMPARATIVE ARITHMETIC.

Q. WHAT *is* Comparative Arithmetic?

A. It is such as answers Questions by Numbers, having *Relation* one to another.

Q. *Wherein does this Relation consist?*

A. It consists either in *Quantity* or *Quality.*

Q. *What is Relation of Numbers in* Quantity?

A. It is the *Respect* that one Number has to another.

Q. *How many are the Numbers propounded?*

A. They are always two; the *Antecedent* and the *Consequent.*

Q. *In what does Relation of Numbers in* Quantity *consist?*

A. It consists in the *Difference*, or else in the *Rate* or *Reason* that is found between the Terms propounded.

Note. The Difference of any two Numbers is the *Remainder*; but the *Rate* or *Reason* is the *Quotient* of the *Antecedent* divided by the *Consequent.*

Q. *What*

Q. *What is Relation of Numbers in* Quality *or* Progression?

A. *Progression* or *Proportion* is the *Respect* that the Reason of Numbers have one to another.

Q. *How many must the Terms be?*

A. *Three* or *more*, but never *less*: Because less than *three* will not admit of a Comparison of *Reasons* or *Differences*.

Of PROGRESSION.

Q. *How many Kinds of* Progression *are there?*

A. Two: *Arithmetical* and *Geometrical*.

Of ARITHMETICAL PROGRESSION.

Q. *What is* Arithmetical Progression?

A. *Arithmetical Progression* is when several Numbers have equal Differences; as 1, 2, 3, 4, differ by 1; or 2, 4, 6, 8, differ by 2.

Note 1. If any Number of Terms differ by *Arithmetical Progression*, the *Sum* of the two *Extremes* will be equal to the Sum of any two *Means* equally distant from the *Extremes*, As in 2, 4, 6, 8; where 2 + 8 are = 4 + 6 = 10, and so of any larger Number of *Terms*.

2. If the Number of *Terms* be odd, the middlemost supplies the Place of two *Terms*. As in 1, 2, 3; where 1 + 3 are = 2 + 2 = 4.

CASE I.

Q. *What do you observe in this first* Case?

A. When the two *Extremes* and the Number of *Terms* in any *Series* of Numbers in *Arithmetical Progression* are given, and the Sum of all the Terms is required, then multiply the *Sum* of the two *Extremes* by half the Number of *Terms*: Or,

Multiply half the *Sum* of the *Extremes* by the whole Number of *Terms*, the *Product* is the Total of all the Terms.

EXAMPLES.

1. How many Strokes doth the Hammer of a Clock strike in 12 Hours? *Answ.* 78.

2. A Merchant hath sold 100 Yards of superfine Cloth, *viz.* the first Yard for 1*s.* the second for 2*s* the third for 3*s.* &c. I demand how much he received for the said Cloth? *Answ.* 252*l.* 10*s.*

3. Bought 19 Yards of Shalloon, and gave 1*d.* for the first Yard, 3*d.* for the second, 5*d.* for the third, &c. increasing 2*d.* every Yard; I demand what I gave for the 19 Yards? *Answ.* 1*l.* 10*s.* 1*d.*

4. A Mercer sold 20 Yards of Silk, at 3*d.* for the first Yard, 6*d.* for the second, 9*d.* for the third, &c. increasing 3*d.* every Yard; I demand what he sold the 20 Yards for? *Answ.* 2*l.* 12*s.* 6*d.*

5. A Butcher bought 100 Head of Cattle, *viz.* Oxen, and gave for the first Ox 1 Crown, for the second Ox 2 Crowns, for the third Ox 3 Crowns, &c. I demand what the Cattle cost him? *Answ.* 1262*l.* 10*s.*

6 Admit

6. Admit 100 Stones were laid 2 Yards distant from each other in a right Line, and a Basket placed 2 Yards from the first Stone; I demand how many Miles a Man shall go in gathering them singly into the Basket? *Answ.* 11 *Miles*, 3 *Furlongs*, 180 *Yards.*

7. A Merchant sold 1000 Yards of Linen at 2 Pins for the first Yard, 4 for the second, 6 for the third, *&c.* increasing 2 Pins, for every Yard; I demand how much the Linen produced, when the Pins were afterwards sold at 12 for a Farthing? Also whether the said Merchant gained or lost by the Sale thereof, and how much, supposing the said Linen to have been bought at 6*d.* *per* Yard?

Answ.	*The Linen produced*	86*l.*	17*s.*	10*d.*
	The Merchant gained	61	17	10

CASE 2.

Q. *What do you observe in this second* Case;

A. When the two *Extremes* and the Number of *Terms* in any *Series* of Numbers in *Arithmetical Progression* are given, and the *common Difference* of all the Terms in that *Series* are required, then

Divide the *Difference* between the two *Extremes*, by the Number of *Terms*, less *one*; the *Quotient* will be the *common Difference.*

EXAMPLES.

1. There are 21 Men, whose ages are equally distant from each other in Arithmetical Progression: The Youngest is 20 Years old, and the Eldest is 60; I demand the common Difference of their Ages, and the Age of each Man? *Answ. The common Difference is two Years: therefore,*

Years.

60 *is the Age of the first Man.*
60—2=58 *is the Age of the Second.*
58—2=56 *is the Age of the Third.*
56—2=54 *is the Age of the Fourth,* &c.

2. A Debt is to be discharged at 16 several Payments in Arithmetical Proportion; the first Payment is to be 14*l.* the last 100*l.* what is the whole Debt, and what must each Payment be? *Answ. The whole Debt is* 912*l. The common Difference is* 5*l.* 14*s.* 8*d.* *therefore,*

							14*l.*	0*s.*	0*d.*	1*st Payment.*
14*l.*	0*s.*	0*d.*	+	5*l.*	14*s.*	8*d.*	= 19	14	8	2*d.*
19	14	8	+	5	14	8	= 25	9	4	3*d.*
25	9	4	+	5	14	8	= 31	4	0	4*th*, &c.

3. A Man

3. A Man is to travel from *York* to a certain Place in 12 Days, and to go but three Miles the first Day, increasing every Day's Journey by an equal Excess, so that the last Day's Journey may be 36 Miles; what will each Day's Journey be, and how many Miles is the Place he goes to distant from *York?* *Answ. The common Difference is* 3; *therefore,*

Miles.

3 *is the first Day's Journey.*
3 + 3 = 6 *is the Second.*
6 + 3 = 9 *is the Third.*
9 + 3 = 12 *is the Fourth,* &c.
The whole Distance is 234 *Miles.*

4. A running Footman, on a Wager, is to travel from *London* Northward, as follows: That is to say, he is to go 4 Miles the first Day; and 40 Miles the last Day; and to go the whole Journey in 10 Days, increasing every Day's Journey by an equal Excess; I demand the Number of Miles he travelled each Day, and the Length of the whole Journey? *Answ. The common Difference is* 4; *therefore,*

Miles.

4 *is the first Day's Journey.*
4 + 4 = 8 *is the Second.*
8 + 4 = 12 *is the Third,* &c.
The whole Journey is 220 *Miles.*

Of GEOMETRICAL PROGRESSION.

Q. *What is* Geometrical Progression?

A. When any *Rank* or *Series* of Numbers *increases* by one *common Multiplier*, or *decreases* by one *common Divisor*, those Numbers are continued in *Geometrical Progression*; as 3, 6, 12, 24, increase by the *Multiplier* 2; and 24, 12, 6, 3, decrease by the *Divisor* 2.

Note 1. If any Number of *Terms* be continued in *Geometrical Progression*, the *Product* of the two *Extremes* will be equal to the *Product* of any two *Means* equally distant from the *Extremes*; as in 3, 6, 12, 24; where 3 × 24, are = 6 × 12 = 72; and so of any larger Number of *Terms*.

2. If the Number of *Terms* be odd, the Middlemost supplies the Place of two *Terms*; as in 3, 6, 12; where 3 × 12 are = 6 × 6 = 36.

3. The *common Multiplier*, and the *common Divisor* are called *Ratios*.

Q. *How*

Q. *How is the* Sum *of any* Series *in* Geometrical Progression *obtained?*

A. 1. When all the *Terms* alone are given, then from the *Product* of the *second* and *last Terms* subtract the *Square* of the *first Term*, that Remainder being divided by the *second Term* less the *first*, will give the *Sum* of all the *Terms*.

2. When the two *Extremes* and the *Ratio* are only given, then Multiply the last *Term* into the *Ratio*, and from that *product* subtract the first *Terms*, that *Remainder* divide by the *Ratio* less an *Unit* or 1, the *Quotient* is the *Sum* of all the *Terms*.

Note 1. As the *last Term* in a long *Series* of Numbers is very tedious to come at by continual *Multiplication*; it would be necessary for the readier finding it out, to have a *Series* of Numbers in *Arithmetical Proportion*, called *Indices*, beginning with an *Unit* whose common Difference is *One*; Also whatsoever Number of *Indices* you make choice of, let as many Numbers (in such *Geometrical Proportion* as are given in the Question) be placed under them.

Thus, { 1, 2, 3, 4, 5, 6, 7 Indices,
{ 2, 4, 8, 16, 32, 64, 128 Numbers in Geometrical Proportion.

2. But if the *first Term* in *Geometrical Proportion* be different from the *Ratio*, the *Indices* must begin with a *Cipher*

Thus, { 0, 1, 2, 3, 4, 5, 6, Indices.
{ 1, 2, 4, 8, 16, 32, 64, Numbers in Geometrical Proportion.

3. When the *Indices* begin with a *Cipher*, the Sum of the *Indices* made choice of, must always be one less than the Number of *Terms* given in the Question; because 1 in the *Indices* stands over the *second Term*, and 2 in the *Indices* stands over the *third Term*, &c.

4. Add any two of these *Indices* together, and that *Sum* will directly correspond with the *Product* of their respective *Terms*.

5. By the Help of these *Indices* and a few of the first *Terms*, in any Series of *Geometrical Progression*, any Term, whose Distance from the first Term is assigned, tho' it were never so far, may speedily be obtained, without producing all the *Terms*.

EXAMPLES.

1. A Man bought a Horse, and by Agreement was to give a Farthing for the first Nail, two for the second, four for the Third, *&c.* there were 4 Shoes, and 8 Nails in each Shoe: I demand what the Horse is worth at that Rate? *Answ.* 4473924*l.* 5*s.* 3*d.* 3 *qrs.*

2. A Merchant sold 15 Yards of Sattin, the first Yard for 1*s.* the second for 2*s.* the third for 4*s.* the fourth for 8*s.* *&c.* I demand the Price of the 15 Yards? *Answ.* 1638*l.* 7*s.*

3. A Draper sold 20 Yards of superfine Cloth, the first Yard for 3*d.* the Second for 9*d.* the third for 27*d.* *&c.* in triple Proportion Geometrical; I demand the Price of the Cloth? *Answ.* 21792402*l.* 10*s.*

4. A Gold

4. A Goldsmith sold 1 *lb.* of Gold, at a Farthing for the first Ounce, a Penny for the second, 4*d.* for the third, &c. in quadruple Proportion Geometrical; I demand what he sold the Whole for; also how much he gained by the Sale thereof, supposing he gave for it 4*l.* 4*s.* *per* Ounce:

Answer { *He sold it for* 5825*l.* 8*s.* 5*d.* 1 *qr.*
And gained 5777 8 5 1

5. A crafty Servant agreed with a Farmer (ignorant in Numbers) to serve him 12 Years, and to have nothing for his Service but the Produce of a Wheat-Corn for the first Year; and that Product to be sowed for the second Year; and so on from Year to Year, until the end of the said Time; I demand the Worth of the whole Produce, supposing the Increase to be but in a tenfold Proportion, and sold out at 4*s.* *per* Bushel? *Answ.* 452112*l.* 4*s.* *rejecting Remainders.*

Note 1. 7680 Wheat or Barly-Corns are supposed to make a Pint, and 64 Pints a Bushel.

2. If the first Term in any *Series*, be either *greater* or *less* than the *Ratio* (*except Unity*) then multiply any *two Terms* together, and their *Product* divide by the *first Term*; that *Quotient* will exactly correspond with the *Sum* of their *Indices*.

6. A Thresher worked 20 Days at a Farmer's, and received for the first Day's Work, 4 Barly-Corns; for the second, 12 Barly-Corns; for the third, 36 Barly-Corns; and so on in triple Proportion Geometrical; I demand what the 20 Day's Labour came to, supposing the whole Quantity to be sold for 2*s.* 6*d.* *per* Bushel? *Answ.* 1773*l.* 7*s.* 6*d.* *rejecting Remainders.*

7. A Merchant sold 30 Yards of fine Velvet, trimmed with Gold very curiously, at 2 Pins for the first Yard, 6 Pins for the second, 18 Pins for the third, &c. in triple Proportion Geometrical; I demand how much the Velvet produced, when the Pins were afterwards sold at 100 for a Farthing; also whether the said Merchant gained or lost by the sale thereof, and how much, supposing the said Velvet to have been bought at 50*l.* *per* Yard?

Answer { *The Velvet produced* 2144699292*l.* 13*s.* 0*d.* ½.
The Merchant gained 2144697792 13 0 ½.

Of PERMUTATION.

Q. WHAT *is* Permutation?

A. Changing the Order of Things.

Q. *How do you find all the* Variations, *any Number of* Things *capable of going through?*

A. Multiply all the given *Terms* one into another continually; the last Product is the Number of *Changes* required.

EXAMPLES.

1. I demand how many Changes may be rung upon twelve Bells; and also how long they would be in ringing but once over, supposing 24 Changes might be rung in one Minute, and the Year to contain 365 Days, 6 Hours? *Answ. The Number of Changes is* 479001600, and the Time is 37 *Years*, 49 *Weeks*, 2 *Days*, 18 *Hours*.

2. Seven Gentlemen that were travelling, met together, by Chance, at a certain Inn upon the Road, where they were so well pleased with their Host, and each others Company, that in a Frolic, they offered him 30*l.* to stay at that Place so long as they, together with him, could sit every Day at Dinner in a different Order: The Host thinking that they could not sit in many different Positions, because there were but a few of them, and that himself would make no considerable Alteration, he being but one, imagined that he should make a good Bargain; and readily (for the Sake of a good Dinner and better company) entered into an Agreement with them, and so made himself the eighth Person; I demand how long they staid at the said Inn, and how many different Positions they sat in? *Answ. The Number of Positions were* 40320; *and the Time that they staid* was 110 *Years*, 142 *Days; allowing the Year to consist of* 365 *Days*, 6 *Hours*.

Note. There is one Thing in *Progression*, and in *Varying the Order of Things*, which is well worth our Observation, and that is, The *Power* of *Numbers*, which is surprizingly great, and beyond common Belief, and is no ways conceivable by a common practitioner, hardly by a very good artist; it being (in Appearance) not so much against *Reason*, as above it, The *first Example* in *Geometrical Progression*, discovers what a prodigious Sum of Money, a Horse sold after that Manner, would produce, *viz.* no less than *Four Millions four hundred and seventy-three thousand nine hundred and twenty-four Pounds;* whereas, if the same Horse had been sold at the same *Rate*, and but a fourth Part of the *Nails*, he would have brought his Owner no more than 5*s.* 3*d.* $\frac{3}{4}$. The *second Example* in *Permutation*, does likewise discover the Impossibility of the Inn-keeper's performing his Promise; and in both, the Simplicity of two Men, who thinking they have got very good *Bargains*, do, instead thereof, find themselves *severe Sufferers.* And altho' at the first Appearance, each Question seems to produce but a mere Trifle; yet upon a *mature Consideration*, there would not be found a Man in the Kingdom able to purchase the *one*, or long-lived enough to stand to the Agreement with the *other.* Hence observe the great Possibility of a Man's being imposed on in this Way by *Sharpers.* without a careful Examination into the Affair, before any Contraction is made.

THE

THE

Schoolmaster's Assistant.

PART II.

Of VULGAR FRACTIONS.

Of Fractions in general.

Q. WHAT *is a* Fraction?

A. It is a broken Number; and signifies the Part or Parts of a whole Number.

Q. *How many kinds of* Fractions *are there?*

A. Two: *Vulgar* and *Decimal.*

Of NOTATION *of* VULGAR FRACTIONS.

Q. *What is a* Vulgar Fraction?

A. Any two Numbers placed thus $\frac{7}{8}$ make a *Vulgar Fraction.*

Q. *What is the upper Number of a* Fraction *called?*

A. It is called *Numerator;* and is the Remainder after Division?

Q. *What is the lower Number called?*

A. It is called *Denominator*; and denotes any Whole divided into Parts; and is the Divisor in Division.

Q. *How many sorts of* Vulgar Fractions *are there?*

A. Three. *Proper*, *Improper*, and *Compound.*

Q. *What is a* Proper Fraction?

A. When the *Numerator* is less than the *Denominator*, as $\frac{7}{8}$.

Q. *How far may a* Proper Fraction *be expressed?*

A. Without End; as $\frac{1}{2}$ may be called $\frac{2}{4}$ or $\frac{3}{6}$ or $\frac{4}{8}$, &c. but the lowest Term $\frac{1}{2}$ is always desired.

Q. *What is an* Improper Fraction?

A. When the *Numerator* is greater than the *Denominator*, as $\frac{8}{7}$.

Q. *What is a* Compound Fraction?

A. It is the Fraction of a Fraction; as $\frac{1}{2}$ of $\frac{2}{3}$, &c.

Of REDUCTION *of* VULGAR FRACTIONS.

CASE I.

Q. HOW *are* Vulgar Fractions *reduced to a* common Denominator?

A. 1. Multiply each *Numerator* into all the *Denominators* but its own, for a new *Numerator.*

2. Multiply all the *Denominators* for a *common Denominator.*

EXAM-

EXAMPLES.

1. Reduce $\frac{3}{6}$ and $\frac{5}{8}$ to a common Denominator. *Facit* $\frac{24}{48}$ & $\frac{30}{48}$.
2. Reduce $\frac{7}{8}$, $\frac{9}{10}$ and $\frac{11}{12}$ to a common Denominator. *Facit* $\frac{840}{960}$, $\frac{864}{960}$, and $\frac{880}{960}$.
3. Reduce $\frac{6}{10}$, $\frac{4}{8}$, $\frac{1}{9}$, and $\frac{6}{7}$ to a common Denominator. *Facit* $\frac{3024}{5040}$, $\frac{2520}{5040}$, $\frac{560}{5040}$, and $\frac{4320}{5040}$.
4. Reduce $\frac{4}{9}$, $\frac{7}{11}$, $\frac{6}{7}$, and $\frac{1}{2}$ to a common Denominator. *Facit* $\frac{616}{1386}$, $\frac{882}{1386}$, $\frac{1188}{1386}$, and $\frac{693}{1386}$.
5. Reduce $\frac{6}{9}$, $\frac{2}{7}$, $\frac{1}{3}$, and $\frac{7}{8}$ to a common Denominator. *Facit* $\frac{1008}{1512}$, $\frac{432}{1512}$, $\frac{504}{1512}$, and $\frac{1323}{1512}$.
6. Reduce $\frac{4}{5}$, $\frac{1}{2}$, $\frac{5}{6}$, and $\frac{2}{8}$ to a common Denominator. *Facit* $\frac{384}{480}$, $\frac{240}{480}$, $\frac{400}{480}$, and $\frac{120}{480}$.

CASE 2.

Q. *How do you reduce a* Vulgar Fraction *to its lowest* Terms?

A. 1. Find a *common Measure* by dividing the lower *Term* by the upper; and that *Divisor* by the *Remainder* following, till nothing remains: the last *Divisor* is the *common Measure.*

2. Divide both Parts of the *Fraction* by the *common Measure*, and the *Quotients* will make the *Fraction* required.

Note 1. If the *common Measure* happens to be 1, the given *Fraction* is already in its lowest *Terms.*

2. When a *Fraction* hath *Ciphers* at the right Hand, it may be abbreviated by cutting them off; thus, $\frac{7|0}{9|0}$.

3. This *Case* will prove *Case* 1.

EXAMPLES.

1. Reduce $\frac{48}{56}$ to its lowest Terms. *Facit* $\frac{6}{7}$.
2. Reduce $\frac{72}{94}$ to its lowest Terms, *Facit* $\frac{36}{47}$.
3. Reduce $\frac{84}{170}$ to its lowest Terms. *Facit* $\frac{42}{85}$.
4. Reduce $\frac{60}{125}$ to its lowest Terms. *Facit* $\frac{12}{25}$.
5. Reduce $\frac{182}{196}$ to its lowest Terms. *Facit* $\frac{13}{14}$.
6. Reduce $\frac{468}{1184}$ to its lowest Terms. *Facit* $\frac{117}{296}$.

CASE 3.

Q. *What is a* mixt Number?

A. It is composed of a *whole Number* and a *Fraction*, thus $7\frac{3}{4}$.

Q. *How is a* mixt Number *reduced to an* improper Fraction?

A. 1. Multiply the *whole Number* into the *Denominator* of the *Fraction.*

2. To the Product add the *Numerator*, for a new *Numerator.*

3. Let its *Denominator*, be the *Denominator* given.

Note. To express a *whole Number* fraction-wise, put 1 for its *Denominator.*

EXAM-

EXAMPLES.

1. Reduce $12\frac{15}{17}$ to an improper Fraction. *Facit* $\frac{219}{17}$
2. Reduce $19\frac{12}{18}$ to an improper Fraction. *Facit* $\frac{354}{18}$
3. Reduce $16\frac{18}{100}$ to an improper Fraction. *Facit* $\frac{1618}{100}$
4. Redqce $12\frac{19}{55}$ to an improper Fraction. *Facit* $\frac{691}{55}$
5. Reduce $100\frac{19}{59}$ to an improper Fraction. *Facit* $\frac{5919}{59}$
6. Reduce $79\frac{12}{19}$ to an improper Fraction. *Facit* $\frac{1513}{19}$

CASE 4.

Q. *How is an* improper Fraction *reduced to its proper* Terms?
A. Divide the *upper Term* by the *lower.*
Note. This *Case*, and *Case* 3, prove each other.

EAMPLES.

1. Reduce $\frac{219}{17}$ to its proper Terms. *Facit* $12\frac{15}{17}$
2. Reduce $\frac{141}{17}$ to its proper Terms. *Facit* $8\frac{5}{17}$
3. Reduce $\frac{126}{48}$ to its proper Terms. *Facit* $2\frac{30}{48}$
4. Reduce $\frac{961}{17}$ to its proper Terms. *Facit* $56\frac{9}{17}$
5. Reduce $\frac{13}{7}$ to its proper Terms. *Facit* $1\frac{6}{7}$
6. Reduce $\frac{24}{7}$ to its proper Terms. *Facit* $3\frac{3}{7}$

CASE 5.

Q. *How do you reduce a* compound Fraction *to a single* one?
A. 1. Multiply all the *Numerators* for a new *Numerator.*
2. Multiply all the *Denominators* for a new *Denominator.*

EXAMPLES.

1. Reduce $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$ to a single Fraction. *Facit* $\frac{6}{24}$
2. Reduce $\frac{7}{8}$ of $\frac{4}{6}$ of $\frac{9}{10}$ to a single Fraction. *Facit* $\frac{252}{480}$
3. Reduce $\frac{12}{14}$ of $\frac{5}{6}$ of $\frac{1}{2}$ to a single Fraction. *Facit* $\frac{60}{168}$
4. Reduce $\frac{5}{9}$ of $\frac{4}{8}$ of $\frac{3}{4}$ to a single Fraction. *Facit* $\frac{60}{288}$
5. Reduce $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{4}{5}$ to a single Fraction. *Facit* $\frac{24}{60}$
6. Reduce $\frac{1}{2}$ of $\frac{8}{9}$ of $\frac{6}{7}$ to a single Fraction. *Facit* $\frac{48}{126}$

CASE 6.

Q. *How do you reduce the* Fraction *of one* Denomination *to the* Fraction *of another, but greater, retaining the same Value?*
A. 1. Reduce the given *Fraction* to a *compound Fraction*, by comparing it with all the *Denominations* between it, and that *Denomination*, which you would reduce it to.
2. Reduce that *compound Fraction* to a *single* one, by *Case* 5.

EXAMPLES.

1. Reduce $\frac{5}{6}$ of a Penny to the Fraction of a Pound. *Facit* $\frac{5}{1440}$ *l.*
2. Reduce $\frac{1}{2}$ of a Farthing to the Fraction of a Shilling. *Facit* $\frac{1}{96}$ *s.*
3. Reduce $\frac{8}{9}$ of an Ounce Troy to the Fraction of a Pound *Facit* $\frac{8}{108}$ *lb.*
4. Reduce $\frac{6}{7}$ of a Pound Avoirdupois to the Fraction of a *C. wt.* *Facit* $\frac{6}{784}$. *C. wt.*
5. Reduce $\frac{9}{13}$ of a Pint of Wine to the Fraction of a *Hhd.* *Facit* $\frac{9}{6552}$ *Hhd.*

CASE 7.

Q. *How do you reduce the* Fraction *of one* Denomination *to the* Fraction *of another, but less, retaining the same Value?*

A. Multiply the given *Numerator*, by the Parts of the *Denominations* between it, and that *Denomination* you would reduce the *Fraction* to, for a new *Numerator*, and place it over the given *Denominator.*

Note. This *Case*, and *Case* 6, prove each other.

EXAMPLES.

1. Reduce $\frac{5}{1440}$ of a Pound to the Fraction of a Penny. *Facit* $\frac{1200}{1440} = \frac{5}{6}$ *d.*
2. Reduce $\frac{1}{96}$ of a Shilling to the Fraction of a Farthing. *Fa.* $\frac{1}{2}$ *qr.*
3. Reduce $\frac{8}{108}$ of a *lb.* Troy to the Fraction of an *Oz.* *Facit* $\frac{8}{9}$ *oz.*
4. Reduce $\frac{6}{784}$ of a *C. wt.* to the Fraction of a *lb.* *Facit* $\frac{6}{7}$ *lb.*
5. Reduce $\frac{9}{6552}$ of a *Hhd.* of Wine to the Fraction of a Pint. *Facit* $\frac{9}{13}$ *Pint.*

CASE 8.

Q. *How do you reduce* Vulgar Fractions *from one* Denomination *to another of the same Value, having the* Numerator of the required Fraction given?

A. As the *Numerator* of the given *Fraction*
Is to its *Denominator:*
So is the *Numerator* of the intended *Fraction*
To its *Denominator.*

EXAMPLES.

1. Reduce $\frac{3}{4}$ to a Fraction of the same Value, whose Numerator shall be 15. *Facit* $\frac{15}{20} = \frac{3}{4}$.
2. Reduce $\frac{7}{8}$ to a Fraction of the same Value, whose Numerator shall be 42. *Facit* $\frac{42}{48}$.
3. Reduce $\frac{3}{4}$ to a Fraction of the same Value, whose Numerator shall be 34. *Facit* $\frac{34}{45}$ $\frac{1}{3}$.
4. Reduce $\frac{5}{9}$ to a Fraction of the same Value, whose Numerator shall be 73. *Facit* $\frac{73}{131}$ $\frac{2}{5}$.

Note. From *Case* 8 and 9, there arises a new *Fraction*, which may not improperly be called a mixt *Fraction.*

CASE

CASSE 9.

Q. *How do you reduce* Vulgar Fractions *from one* Denomination *to another of the same Value, having the* Denominator *of the* required Fraction *given.*

A. As the *Denominator* of the given *Fraction*
Is to its *Numerator:*
So is the *Denominator* of the intended *Fraction*
To its *Numerator.*

Note. This *Case*, and *Case* 8, prove each other.

EXAMPLES.

1. Reduce $\frac{3}{4}$ to a Fraction of the same Value, whose Denominator shall be 20. *Facit* $\frac{15}{20}=\frac{3}{4}$.
2. Reduce $\frac{7}{8}$ to a Fraction of the same Value, whose Denominator shall be 49. *Facit* $\frac{42}{49}$ $\frac{7}{8}$.
3. Reduce $\frac{3}{4}$ to a Fraction of the same Value, whose Denominator shall be 46. *Facit.* $\frac{43}{46}$ $\frac{2}{4}$.
4. Reduce $\frac{5}{9}$ to a Fraction of the same Value, whose Denominator shall be 131 $\frac{2}{5}$. *Facit* $\frac{73}{131}$ $\frac{2}{5}$.

CASE 10.

Q. *How is a* mixt Fraction *reduced to a* single *one?*

A. 1. When the *Numerator* is the *integral* Part: Then

(1) Multiply it by the *Denominator* of the *fractional* Part, and to that *Product* add the *Numerator* of the *fractional* Part for a new *Numerator.*

(2) Multiply the *Denominator* of the *Fraction* by the *Denominator* of the *fractional* Part of the *Numerator*, for a new *Denominator.*

Note. This proves *Case* 9

EXAMPLES.

1. Reduce $\frac{42}{49}$ $\frac{7}{8}$ to a simple Fraction. *Facit* $\frac{7}{8}$
2. Reduce $\frac{34}{46}$ $\frac{1}{2}$ to a simple Fraction. *Facit* $\frac{3}{4}$
3. Reduce $\frac{17}{43}$ $\frac{4}{9}$ to a simple Fraction. *Facit* $\frac{157}{387}$

2. When the *Denominator* is the *integral* Part: Then

(1) Multiply it by the *Denominator* of the *fractional* Part, and to that *Product* add the *Numerator* of the *fractional* Part, for a new *Denominator.*

(2) Multiply the *Numerator* of the *Fraction* by the *Denominator* of the *fractional* Part, for a new *Numerator.*

Note. This proves *Case* 8.

EXAMPLES.

1. Reduce $\frac{73}{131}$ $\frac{2}{5}$ to a simple Fraction. *Facit* $\frac{365}{657}=\frac{5}{9}$
2. Reduce $\frac{41}{73}$ $\frac{1}{4}$ to a simple Fraction. *Facit* $\frac{164}{293}$
3. Reduce $\frac{7}{19}$ $\frac{3}{5}$ to a simple Fraction. *Facit* $\frac{35}{98}=\frac{5}{14}$

CASE

CASE II.

Q. *How do you find the* proper Quantity *of a* Fraction in the known Parts of an Integer?

A. Multiply the *Numerator* by the common Parts of the *Integer*, and divide by the *Denominator*.

EXAMPLES.

1. Reduce $\frac{2}{3}$ of a Pound Sterling to its proper Quantity. *Facit* 13*s.* 4*d.*

2. Reduce $\frac{18}{43}$ of a Shilling to its proper Quantity. *Facit* 5*d.* $\frac{1}{43}$.

3. Reduce $\frac{6}{7}$ of 5*l.* 9*s.* to its proper Quantity. *Facit* 4*l.* 13*s.* 5*d.* $\frac{1}{7}$.

4. Reduce $\frac{12}{16}$ of a *lb.* Troy to its proper Quantity. *Facit* 9 *oz.*

5. Reduce $\frac{12}{78}$ of a Tun Weight to its proper Quantity. *Facit* 3 *C.* 0 *qrs.* 8 *lb.* 9 *oz.* 13 *dr.* $\frac{42}{78}$.

6. Reduce $\frac{5}{9}$ of a *lb.* Avoirdupois to its proper Quantity. *Facit* 8 *oz.* 14 *dr.* $\frac{2}{9}$.

7. Reduce $\frac{9}{11}$ of 10 *C.* 1 *qr.* 12 *lb.* to its proper Quantity. *Facit* 8 *C.* 1 *qr.* 25 *lb.* 1 *oz.* 7 *dr.* $\frac{3}{11}$

8. Reduce $\frac{4}{7}$ of a Mile to its proper Quantity. *Facit* 4 *fur.* 125 *yds.* 2 *feet.* 1 *in.* 2 *bc.* $\frac{1}{7}$.

9. Reduce $\frac{9}{10}$ of a Yard to its proper Quantity. *Facit* 2 *feet*, 8 *in.* 1 *bc.* $\frac{2}{10}$.

10. Reduce $\frac{4}{5}$ of an Ell English to its proper Quantity. *Facit* 1 *Yard.*

11. Reduce $\frac{7}{10}$ of an Acre to its proper Quantity. *Facit* 1 *Rood*, 30 *Perches.*

12. Reduce $\frac{4}{9}$ of a Tun of Wine to its proper Quantity. *Facit* 1 *hhd.* 49 *galls.*

13. Reduce $\frac{7}{8}$ of a Barrel of Beer to its proper Quantity. *Facit* 30 *galls.* $\frac{1}{2}$.

14. Reduce $\frac{3}{8}$ of a Chaldron of Coals to its proper Quantity. *Facit* 13 *bush.* $\frac{1}{2}$.

15. Reduce $\frac{2}{7}$ of a Quarter of Corn to its proper Quantity. *Facit* 2 *bush.* 1 *peck*, $\frac{1}{7}$.

16. Reduce $\frac{7}{13}$ of a Day natural to its proper Quantity. *Facit* 12 *hrs.* 55 *min.* 23 *sec.* $\frac{1}{13}$.

17. Reduce $\frac{4}{5}$ of a Month to its proper Quantity. *Facit* 3 *weeks*, 1 *day*, 9 *hours*, 6 *min.*

18. What is the proper Quantity of $\frac{7}{8}$ of a Yard of Cloth? *Answ.* 3 *qrs.* 2 *na.*

19. What is the proper Quantity of $\frac{2}{9}$ of a *hhd.* of Beer? *Answ.* 12 *galls.*

20. What is the proper Quantity of $\frac{3}{10}$ of a Barrel of Ale? *Answ.* 6 *galls.*

CASE

CASE 12.

Q. *How do you reduce any given* Quantity *to the* Fraction *of any greater Denomination of the same Kind?*

A. 1. Reduce the given Quantity to the lowest Term mentioned for a *Numerator*.

2. Reduce the *integral* Part to the same Term for a *Denominator*; and that will be the *Fraction* required.

Note 1. If there be a *Fraction* given with the said Quantity, let it be put to the *Numerator* of the *Fraction* required.

2. *Cases* 11 and 12 prove each other.

EXAMPLES.

1. Reduce 13*s.* 4*d.* to the Fraction of a Pound Sterling. *Facit* $\frac{160}{240} = \frac{2}{3}$*l.*

2. Reduce 5*d.* $\frac{1}{43}$ to the Fraction of a Shilling. *Facit* $\frac{18}{43}$*s.*

3. What Part of 5*l.* 9*s.* is 4*l.* 13*s.* 5*d.* $\frac{1}{7}$. *Answ.* $\frac{6}{7}$.

4. Reduce 9 *oz.* Troy to the Fraction of a *lb.* *Facit* $\frac{9}{12} = \frac{3}{4}$*lb.*

5. Reduce 3 *C.* 0 *qr.* 8 *lb.* 9 *oz.* 13 *dr.* $\frac{42}{78}$ to the Fraction of a Tun. *Facit* $\frac{12}{78}$ *Tun.*

6. Reduce 8 *oz.* 14 *dr.* $\frac{2}{9}$ to the Fraction of a *lb.* Avoirdupois. *Facit* $\frac{5}{9}$ *lb.*

7. What Part of 10 *C.* 1 *qr.* 12 *lb.* is 8 *C.* 1 *qr.* 25 *lb.* 1 *oz.* 7 *dr.* $\frac{3}{11}$? *Answ.* $\frac{9}{11}$.

8. Reduce 4 *fur.* 125 *yds.* 2 *feet.* 1 *in.* 2 *bc.* $\frac{1}{7}$ to the Fraction of a Mile. *Facit* $\frac{4}{7}$ *Mile.*

9. Reduce 2 *feet,* 8 *in.* 1 *bc.* $\frac{2}{10}$ to the Fraction of a Yard. *Facit* $\frac{9}{10}$ *Yard.*

10. Reduce 1 Yard to the Fraction of an Ell. *Facit* $\frac{4}{5}$ *Ell.*

11. Reduce 1 *Rood,* 30 *Poles,* to the Fraction of an Acre. *Facit* $\frac{7}{10}$ *Acre.*

12. Reduce 1 *hhd.* 49 *gals.* of Wine to the Fraction of a Tun. *Facit* $\frac{4}{9}$ *Tun.*

13. Reduce 31 *gals.* $\frac{1}{2}$ of Beer to the Fraction of a Barrel. *Facit* $\frac{7}{8}$ *Barrel.*

14. Reduce 13 *bush.* $\frac{1}{2}$ of Coals to the Fraction of a Chaldron. *Facit* $\frac{3}{8}$ *Chaldron.*

15. Reduce 9 *bush.* 1 *peck,* $\frac{1}{7}$ of Corn to the Fraction of a Quarter. *Facit* $\frac{2}{7}$ *Quarter.*

16. Reduce 12 *hrs.* 55 *min.* 23 *sec.* $\frac{1}{13}$ to the Fraction of a Day natural. *Facit* $\frac{7}{13}$ *Day.*

17. Reduce 3 *weeks,* 1 *day,* 9 *hrs.* 36 *min.* to the Fraction of a Month. *Facit* $\frac{4}{5}$ *Month.*

18. Reduce 3 *qrs.* 2 *na.* to the Fraction of a Yard. *Facit* $\frac{7}{8}$ *Yard.*

19. Reduce 12 *gals.* of Beer to the Fract. of a *hhd. Facit* $\frac{4}{18}$ *hhd.*

20. Reduce 6 *gals.* of Ale to the Fract. of a *Bar. Facit* $\frac{3}{10}$ *bar.*

21. Reduce 13 *hrs.* 30 *min.* to the Fraction of a Day. *Facit* $\frac{840}{1440} = \frac{9}{10}$.

Of ADDITION *of* VULGAR FRACTIONS.

Q. HOW *are* Vulgar Fractions *added together?*

A. 1. Reduce the given *Fractions* to a common *Denominator.*

2. Add all the *Numerators* together for a new *Numerator;* under which subscribe the common *Denominator.*

Note. This *Rule* is proved by *Subtraction* when two *Fractions* only are given.

EXAMPLES.

1. Add $\frac{1}{2}$ and $\frac{7}{8}$ together - - - *Facit* 1 $\frac{6}{10}$
2. Add $\frac{7}{10}$ and $\frac{11}{12}$ and $\frac{4}{9}$ together - *Facit* 2 $\frac{66}{1080}$
3. Add 19 and 7 and $\frac{1}{2}$ of $\frac{2}{3}$ together - *Facit* 26 $\frac{2}{6}$
4. Add $\frac{1}{2}$ of $\frac{7}{8}$ and $\frac{2}{3}$ of $\frac{10}{20}$ together - *Facit* 1 $\frac{68}{930}$
5. Add $\frac{1}{3}$ of 95 and $\frac{7}{8}$ of 14 together - *Facit* 43 $\frac{22}{24}$
6. Add $\frac{2}{3}$ and 17 $\frac{1}{2}$ together - - - *Facit* 18 $\frac{1}{6}$
7. Add 12 $\frac{1}{2}$ and 3 $\frac{2}{3}$ and 4 $\frac{3}{4}$ together - *Facit* 20 $\frac{22}{24}$
8. Add 6 $\frac{7}{8}$ of $\frac{9}{10}$ and $\frac{4}{7}$ of $\frac{1}{2}$ and 7 $\frac{1}{2}$ together *Facit* 14 $\frac{1284}{2240}$

Note In order to find the following *Facits*, the *Fractions* given must be reduced to their proper *Quantities* by *Case* 11, in *Reduction*, and then added, as in *Addition of whole Numbers*

9. Add $\frac{7}{8}$ of a Pound to $\frac{3}{4}$ of a Shilling. *Facit* 18*s.* 3*d.*
10. Add $\frac{3}{4}$ of a Penny to $\frac{1}{9}$ of a Pound. *Facit* 2*s.* 3*d.* 1 *qr.* $\frac{6}{9}$.
11. Add $\frac{1}{2}$ of a *lb.* Troy to $\frac{7}{12}$ of an *oz. Facit* 6 *oz.* 11 *dwts.* 16 *grs.*
12. Add $\frac{4}{7}$ of a Tun to $\frac{9}{10}$ of an *C. wt. Facit* 12 *C.* 1 *qr.* 8 *lb.* 12 *oz.* 12 *dr.* $\frac{8}{10}$.
13. Add $\frac{3}{4}$ of a Mile to $\frac{7}{10}$ of a Furlong, *Facit* 6 *Fur.* 28 *Poles.*
14. Add $\frac{1}{2}$ of a Yard to $\frac{2}{3}$ of a Foot. *Facit* 2 *feet.* 2 *in.*
15. Add $\frac{1}{3}$ of a Day to $\frac{1}{2}$ of an Hour. *Facit* 8 *hrs.* 30 *min.*
16. Add $\frac{4}{9}$ of a Chaldron to $\frac{7}{8}$ of a Bush. *Facit* 16 *bush.* 3 *pecks* $\frac{1}{2}$.
17. Add $\frac{1}{3}$ of a Week, $\frac{1}{4}$ of a Day, and $\frac{1}{2}$ of an Hour together. *Facit* 2 *days,* 14 *hrs.* $\frac{1}{2}$.
18. Add $\frac{2}{3}$ of a Yard, $\frac{3}{4}$ of a Foot, and $\frac{7}{8}$ of a Mile together. *Facit* 1540 *yds.* 2 *feet,* 9 *in.*

Of SUBTRACTION *of* VULGAR FRACTIONS.

Q. HOW *are* Vulgar Fractions *subtracted?*

A. 1. Reduce the given *Fractions* to a common *Denominator.*

2. *Subtract* the lesser *Numerator* from the greater, and place it over the common *Denominator.*

3. When

3. When the lower *Fraction* is greater than the upper, subtract the *Numerator* of the lower Fraction from the *Denominator*, and to that Difference add the upper *Numerator*, carrying *one* to the *Units* Place of the lower whole Number.

Note. *This Rule is proved by* Addition.

EXAMPLES.

1. From $\frac{111}{112}$ take $\frac{3}{4}$ - - - *Facit* $\frac{108}{448}$
2. From $\frac{97}{100}$ take $\frac{3}{7}$ - - - *Facit* $\frac{379}{700}$
3. From $96\frac{1}{3}$ take $1\frac{3}{7}$ - - *Facit* $81\frac{19}{21}$
4. From 96 take $\frac{3}{5}$ - - - *Facit* $95\frac{2}{5}$
5. From $\frac{1}{3}$ of 76 take $\frac{3}{4}$ of 21 *Facit* $9\frac{7}{12}$
6. From $\frac{109}{110}$ take $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$ *Facit* $\frac{1956}{2640}$
7. From $71\frac{1}{2}$ take $\frac{17}{19}$ - - *Facit* $70\frac{23}{38}$
8. From $14\frac{1}{4}$ take $\frac{2}{3}$ of 19 - *Facit* $1\frac{7}{12}$

Note. In order to find the following *Facits* the *Fractions* given must be reduced to their proper *Quantities* by *Case* 11, in *Reduction*, and then subtracted, as in *Subtraction* of *whole Numbers*.

9. From $\frac{1}{2}$ of a Pound take $\frac{3}{4}$ of a Shilling. *Facit* 9*s.* 3*d.*
10. From $\frac{1}{2}$ of a Shilling take $\frac{3}{4}$ of a Penny. *Facit* 5*d.* $\frac{1}{4}$.
11. From $\frac{3}{5}$ of an *oz.* take $\frac{7}{8}$ of a *dwt.* *Facit* 11 *dwt.* 3 *gr.*
12. From $\frac{1}{2}$ of an *C. wt.* take $\frac{7}{12}$ of a Pound. *Facit* 1 *qr.* 27*lb.* 6 *oz.* 10 *dr.* $\frac{8}{12}$.
13. From $\frac{2}{3}$ of a League take $\frac{7}{10}$ of a Mile. *Facit* 1 *mile*, 2 *fur.* 16 *poles.*
14. From 1 Ell take $\frac{7}{10}$ of a *qr.* *Facit* 1 *yd.* 0 *qr.* 1 *na.* $\frac{2}{10}$.
15. From $\frac{3}{12}$ of a *hhd.* of Beer take 1 Gall. *Facit* 12 *gals.* $\frac{1}{2}$.
16. From $\frac{4}{8}$ of a Chaldron take $\frac{2}{3}$ of a Bushel. *Facit* 17 *bush.* 1 *peck* $\frac{1}{3}$.
17. From 7 Weeks take 9 Days $\frac{7}{10}$. *Facit* 5 *wks.* 4 *days*, 7 *hrs.* 12 *min.*
18. From 4 *days.* 7 *hrs.* $\frac{1}{2}$ take 1 *day*, 9 *hrs.* $\frac{3}{18}$ *Facit* 2 *da.* 22 *hr.* $\frac{1}{3}$.

Of MULTIPLICATION *of* VULGAR FRACTIONS.

Q. HOW *are* Vulgar Fractions *multiplied?*

A. 1. Prepare the given Numbers (if need be) by the Rules of *Reduction.*

2. Multiply all the given *Numerators* for a new *Numerator*, and all the *Denominators* for a new *Denominator.*

Note. When any *Number*, either *whole* or *mixed*, is multiplied by a *Fraction*, the *Product* is always *less* than the *Multiplicand*, in the same *Proportion* as the multiplying *Fraction* is *less* than 1 or an *Unit.*

EXAM-

EXAMPLES.

1. Multiply $\frac{3}{7}$	by $\frac{3}{11}$	- -	*Facit* $\frac{9}{77}$
2. Multiply $\frac{4}{8}$	by $\frac{7}{9}$	- -	*Facit* $\frac{28}{72}$
3. Multiply $\frac{1}{3}$ of $\frac{4}{5}$	by $\frac{7}{10}$ of $\frac{11}{12}$		*Facit* $\frac{308}{1800}$
4. Multiply 7 $\frac{1}{4}$	by 8 $\frac{1}{2}$	-	*Facit* 61 $\frac{3}{8}$
5. Multiply 4 $\frac{1}{2}$	by $\frac{1}{8}$	- -	*Facit* $\frac{9}{16}$
6. Multiply $\frac{7}{8}$	by 13 $\frac{9}{10}$	-	*Facit* 12 $\frac{13}{80}$
7. Multiply $\frac{1}{2}$ of 7	by $\frac{3}{6}$	- -	*Facit* 1 $\frac{9}{12}$
8. Multiply $\frac{3}{8}$ of 8	by $\frac{7}{8}$ of 5	-	*Facit* 21
9. Multiply $\frac{3}{6}$	by $\frac{4}{9}$ of 11		*Facit* 2 $\frac{24}{54}$
10. Multiply $\frac{4}{5}$ of 19	by 71 $\frac{1}{2}$	-	*Facit* 5205 $\frac{2}{10}$
11. Multiply 12 $\frac{3}{5}$	by $\frac{2}{6}$ of 7	-	*Facit* 29 $\frac{12}{30}$
12. Multiply 7 $\frac{1}{2}$	by 9 $\frac{1}{4}$	- -	*Facit* 69 $\frac{3}{8}$.

Of DIVISION *of* VULGAR FRACTIONS.

Q. HOW *are* Vulgar Fractions *divided?*

A. 1. Prepare the Numbers given (if need be) by the Rules of *Reduction.*

2. Multiply the *Denominator* of the *Divisor* into the *Numerator* of the *Dividend*, for a new *Numerator*; and the *Numerator* of the *Divisor* into the *Denominator* of the *Dividend*, for a new *Denominator*.

Note 1. When the *Dividend* is greater than the *Divisor*, the *Quotient* will be greater than the *Dividend*; But when the *Dividend* is less than the *Divisor*, then the *Quotient* will be less than the *Dividend*, and in the same Proportion as an *Unit* is greater or less than the dividing *Fraction*.

2. Multiplication *and* Division *prove each other.*

EXAMPLES.

1. Divide $\frac{17}{24}$	by $\frac{3}{5}$	- - -	*Facit* 1 $\frac{22}{63}$
2. Divide $\frac{13}{19}$	by $\frac{7}{9}$	- - -	*Facit* $\frac{117}{138}$
3. Divide $\frac{4}{18}$	by $\frac{7}{10}$	- - -	*Facit* 1 $\frac{14}{126}$
4. Divide 1 $\frac{1}{2}$	by 4 $\frac{8}{10}$	- -	*Facit* $\frac{30}{96}$
5. Divide $\frac{7}{8}$	by 4	- - -	*Facit* $\frac{7}{32}$
6. Divide 4	by $\frac{7}{8}$	- - -	*Facit* 4 $\frac{4}{7}$
7. Divide 99	by 108	- -	*Facit* $\frac{90}{108}$
8. Divide $\frac{1}{5}$ of 19	by $\frac{2}{3}$ of $\frac{3}{4}$	-	*Facit* 7 $\frac{18}{30}$
9. Divide $\frac{1}{2}$ of $\frac{2}{3}$	by $\frac{2}{3}$ of $\frac{3}{4}$	-	*Facit* $\frac{24}{36}$
10. Divide $\frac{2}{4}$ of $\frac{3}{4}$	by $\frac{1}{2}$ of $\frac{2}{3}$	-	*Facit* 1 $\frac{12}{24}$
11. Divide 4 $\frac{5}{9}$	by $\frac{5}{9}$ of 4	-	*Facit* 2 $\frac{1}{20}$
12. Divide $\frac{5}{9}$ of 4	by 4 $\frac{5}{9}$	- -	*Facit* $\frac{20}{41}$.

Of

Of the Single RULE *of* THREE DIRECT *in* VULGAR FRACTIONS.

Q. HOW *is the* Rule *of* Three *in* Fractions *performed?*

A. The Operations of the *Rule* of *Three* in *Fractions*, both *Single* and *Double*, *Vulgar* and *Decimal*, are exactly agreeable to the Principles laid down in the same Rules in whole Numbers.

Q. *How are the following* Examples *proved?*

A. By changing the Order of them.

EXAMPLES.

1. If $\frac{11}{13}$ *lb.* of Sugar cost $\frac{7}{15}$ of a Shilling, what cost $\frac{32}{43}$ *lb.?* *Answ.* $\frac{2910}{9325}$*s* $=4d.$ 3 *qrs.* $\frac{4971}{9325}$.

2. If $\frac{3}{5}$ Ell cost $\frac{2}{3}$*l.* what cost $\frac{12}{17}$ Ell? *Answ.* 15*s.* 8*d.* $\frac{36}{153}$.

3. If $\frac{4}{7}$ Ell cost $\frac{7}{12}$*l.* what cost 1 Ell? *Answ.* 18*s.* 10*d.* $\frac{8}{21}$.

4. If 2 *oz.* of Silver cost 16*s.* 5*d.* what cost $\frac{3}{4}$ *oz.?* *Answ.* 6*s.* 1*d.* 3 *qrs.* $\frac{1}{2}$.

5. If 6 Yards $\frac{1}{2}$ cost 18*s.* what cost 9 Yards $\frac{1}{4}$? *Answ.* 1*l.* 5*s.* 7*d.* 1*qr.* $\frac{28}{52}$.

6. If 1 Dollar be worth 56*d.* $\frac{3}{5}$, what are 500 Dollars worth? *Answ.* 117*l.* 18*s.* 4*d.*

7. If 1 *yd.* $\frac{1}{4}$ cost 9*s.* what cost 16 *yds.* $\frac{1}{4}$? *Answ.* 5*l.* 17*s.*

8. If 1 Pistole be 17*s.* $\frac{1}{5}$, what are 100 Pistoles? *Answ.* 86*l.*

9. If $\frac{5}{7}$ *oz.* cost $\frac{11}{13}$*l.* what cost 1 *oz.?* *Answ.* 1*l.* 5*s.* 8*d.*

10. If an Ingot of Silver weighs 16 *oz.* $\frac{11}{13}$, what is it worth at 5*s.* 6*d.* *per oz.?* *Answ.* 4*l.* 12*s.* 0*d.* 1 *qr.* $\frac{9}{13}$.

11. If $\frac{9}{10}$ *C.* cost 14*l.* 4*s.* what will 7 *C.* $\frac{1}{2}$ cost? *Answ.* 118*l.* 16*s.* 8*d.*

12. If $\frac{3}{5}$ of an Ell cost $\frac{2}{3}$ of 19*s.* what cost 7 Ells? *Answ.* 7*l.* 17*s.* 9*d.* 1*qr.* $\frac{8}{9}$.

13. If 8 *lb.* of Tobacco cost 4*s.* 9*d.* $\frac{3}{5}$, what cost 1*lb.?* *Answ.* 7*d.* $\frac{1}{5}$.

14. If 1 *yd.* of broad Cloth cost 15*s.* $\frac{5}{8}$, what will 4 Pieces, each containing 27 *yds.* $\frac{3}{8}$ cost? *Answ.* 85*l.* 10*s.* 11*d.* $\frac{1}{4}$.

15. A Mercer bought 3 Pieces $\frac{1}{2}$ of Silk, each containing 24 *Yards* $\frac{1}{3}$, at 6*s.* 0*d.* $\frac{1}{2}$ *per Yard;* I demand the Value of the 3 Pieces $\frac{1}{2}$ at that Rate? *Answ.* 25*l.* 14*s.* 6*d.* 2 *qrs.* $\frac{4}{12}$.

16. If $\frac{1}{3}$ *lb.* less by $\frac{1}{6}$, cost 13*d.* $\frac{1}{5}$, what cost 14 *lb.* less by $\frac{1}{5}$ of 2 *lb.?* *Answ.* 4*l.* 9*s.* 9*d.* $\frac{3}{25}$.

17. A Merchant had 5 *C.* $\frac{8}{9}$ of Sugar, at 6*d.* $\frac{3}{4}$ *per lb.* which he would barter for Tea, at 8*s.* $\frac{5}{8}$ *per lb.* I demand how much Tea must be given for the Sugar? *Answ* 43 *lb.* $\frac{6}{414}$.

18. Bought 120 *lb.* of Tea, at 8*s.* $\frac{5}{8}$ *per lb.* and sold it for 70*l.* What was the Gain *per Cent.?* *Answ.* 35*l.* 5*s.* 3*d.* 3 *qrs.* $\frac{75}{385}$.

Of the SINGLE RULE *of* THREE INVERSE *in* VULGAR FRACTIONS.

1. IF 3 $\frac{1}{4}$ Yards of Cloth that is 1 $\frac{1}{3}$ Yard wide, be sufficient to make a Cloke; how much must I have of that Sort which is $\frac{4}{5}$ of a Yard wide to make a Cloke of the same Bigness? *Answ.* 4 $\frac{7}{8}$ *Yards*

2. If 16 Men finish a Piece of Work in 28 $\frac{1}{3}$ Days, how long will 12 Men require to do the same Work? *Answ.* 37 $\frac{28}{36}$ *Days.*

3. If 1 $\frac{1}{4}$ Yard in breadth require 20 $\frac{1}{2}$ Yards long to make a Garment; what Length will $\frac{3}{4}$ of a Yard wide require to make the same? *Answ.* 34 $\frac{4}{24}$.

4. How many Pieces of Merchandize, at 20*s.* $\frac{1}{8}$ *per* Piece, are to be given for 240 Pieces $\frac{1}{7}$, at 12*s.* $\frac{1}{2}$ *per* Piece? *Answ.* 149 $\frac{354}{2254}$ *Pieces.*

5. How many Yards of Canvas that is 1 Yard $\frac{1}{4}$ wide, will be sufficient to line 20 Yards of Say, that is $\frac{3}{4}$ of a Yard wide? *Answ.* 12 *Yards of Canvas.*

Of the DOUBLE RULE *of* THREE *in* VULGAR FRACTIONS.

1. IF 9 Students spend 10*l.* $\frac{7}{9}$ in 18 Days; how much will 20 Students spend in 30 Days? *Answ.* 39*l.* 18*s.* 4*d.* $\frac{360}{1458}$.

2. Three Men having worked 19 Days $\frac{1}{2}$, received 8*l.* $\frac{9}{10}$. how much must 20 Men have for 100 Days $\frac{1}{4}$? *Answ.* 305*l.* 0*s.* 8*d.* +.

3. A Man and his Wife having laboured 1 Day, earned 4*s.* $\frac{5}{8}$; I demand how much they must have for 10 Days $\frac{1}{2}$, when their two Sons helped them? *Answ.* 4*l.* 17*s.* 1*d.* $\frac{1}{2}$.

4. A Man with his Family, which in all were 5 Persons, did usually drink 7 Gallons $\frac{4}{5}$ of Beer in a Week; how much will be drank in 22 Weeks $\frac{1}{2}$ when 3 Persons more come into the Family? *Answ.* 280 $\frac{40}{50}$ *galls.*

5. Seven Men with their Wives, upon examining into their Expences for 20 Weeks past, found that they had laid out 40*l.* $\frac{4}{5}$. I demand in what Time 20*l.* $\frac{3}{5}$ may be spent by 46 Men in the like Proportion? *Answ.* 3 *Weeks,* $\frac{31136}{65688}$.

6. Three Sailors having been abroad 9 Months $\frac{1}{4}$, received 40*l.* $\frac{3}{15}$: I demand how much 100 Sailors must receive for 2 Months $\frac{3}{7}$ Service? *Answ.* 4118*l.* 6*s.* 0*d.* $\frac{1}{4}$ +.

THE

THE

Schoolmaster's Assistant.

PART III.

Of DECIMAL FRACTIONS.

Q. WHAT *do you understand by* Decimals *in general?*

A. Any Thing which is called *One;* as one *Foot*, one *Pound*, one *Shilling*, one *Year*, &c is conceived in imagination to be divided into *ten* equal *Parts*, and every one of those Parts into *ten* other equal *Parts;* and so on, by a *Decimal* Division, without End.

Q. *What is a* Decimal Fraction?

A. Any Number having a Point placed before it, thus, .641 is a Decimal.

Q. *How do you distinguish a* whole Number *from a* Decimal Fraction?

A. Any Number having a Point placed after it thus, 641. is the whole *Number.*

Q. *What is a mixt* Number?

A. Any Quantity of Figures having a Point placed somewhere between them, thus, 6.41, or thus 64.1, is a mixt Number.

Note. The *Decimal Point* must never be omitted; because without it a *Decimal* cannot be distinguished from a *whole* or *mixt Number.* But when a *whole Number* alone is given, it is as common to omit it as to insert it; as appears by several *Examples* following.

Of NOTATION *of* DECIMALS.

Q. HOW *do* Decimal Places *increase?*

A. In the same Manner as whole Numbers do; that is, by *Tens:* For every Place towards the left Hand is ten times greater than that which is next it towards the right Hand, as appears by the following *Table.*

TABLE.

TABLE.

C. Thousands	X. Thousands	Thousands	Hundreds	Tens	Units	Tenth Parts	Hundredth Parts	Thousandth Parts	X. Thousandth Parts	C. Thousandth Parts
6	5	4	3	2	1 .	2	3	4	5	6

Q. *May not* Ciphers *sometimes be annexed to* Decimals?

A. They may; but they alter not their Value: Thus .41 and .4100 are the same.

Q. *May not* Ciphers *sometimes be prefixed to* Decimal Parts?

A. Yes; and then they decrease their Value, by removing them farther from the Point: Thus .0041 is less than .41.

Of ADDITION *and* SUBTRACTION *of* DECIMALS.

Q. HOW *are* Decimals *added or subtracted?*

A. Place the Numbers according to their Value, and work as in *Addition* or *Subtraction* of whole Numbers.

Q. *How are the Operations proved?*

A. As in whole Numbers.

EXAMPLES *in* ADDITION.

Shillings.	*Yds.*	*Galls.*	*£.*
14.471	47.4	7004.16	71.001
1.191	19.71	712.712	120.07
1.8126	461.721	19.0174	31.121
3.6126	400.004	7.3126	13.4101
7.1281	7.1004	71.1851	76.04
18.8126	7.07	3.108	7.3

Miles

Miles.	*lb.*	*Acres.*	*Ounces.*
41.8102	86.18104	.61271	48.9108
140.037	3.14	.8712	1.8191
18.10	1.181	.012	3.1080
7.8141	7.7121	.87	.7012
16.4612	8.19817	.04	.0012
7.81	13.071	.4	.0018

EXAMPLES *in* SUBTRACTION.

	Years.	*Days.*	*Weeks.*	*Hours.*
From	1081.761	712.10009	127.19	12.
Take	10.00012	7.121	121.	.12
Rem.				

	Minutes.	*Months.*	*Ells.*	*Tuns.*
From	174.1	6100.	.172618	761.8109
Take	1.471	6.109	.0000148	18.9112
Rem.				

Of MULTIPLICATION *of* DECIMALS.

Q. HOW *are* Decimals *multiplied?*
A. As whole Numbers are.

Note. 1. When Numbers are multiplied, make as many *Decimal Parts* in the *Product*, as there are in the two *Factors* taken together.
2. If *Decimal Places* are wanted in the *Product*, supply them with *Ciphers* to the *Decimal Point.*
3. Observe the same *Note here*, which is given in *Multiplication* of *Vulgar Fractions.*

Q. *How are the following* Examples *proved?*
A. By inverting the *Factors.*

EXAM-

EXAMPLES.

1. Multiply .612	by 4.12	8. Multiply .00041	by .00017
2. Multiply 48.	by .48	9 Multiply .0027	by 41.
3. Multiply 37.9	by 46.5	10. Multiply 410.	by .0012
4. Multiply .121	by 17.2	11 Multiply .07	by 07.
5. Multiply 1.81	by 71.	12. Multiply 1.007	by .041
6. Multiply 4 1	by .142	13. Multiply 4.001	by .004
7. Multiply .00071	by .121	14. Multiply .004	by .004

Of DIVISION *of* DECIMALS.

Q. HOW *are* Decimals *divided?*

A. As whole Numbers are.

Note 1. The *Decimal Places* of the *Divisor* and *Quotient* must always be equal to those in the *Dividend.*

2. If there be more *Decimals* in the *Divisor,* than in the *Dividend,* annex as many Ciphers as you please to the *Dividend,* so as to be equal at least to the *Divisor.*

3. If *Decimal Places* are wanting in the *Quotient,* they must be supplied with *Ciphers* to the *Decimal Point.*

4. Observe the same *Note* here, which is given in *Division* of *Vulgar Fractions.*

Q. *How are the following* Examples *proved?*

A. By *Multiplication.*

EXAMPLES.

1. Divide 19.4	by 37.5	7. Divide 9.	by .7121
2. Divide 47121.1	by 47.	8. Divide 9.	by .9
3. Divide 4 18	by .1812	9. Divide 14.	by 47.31
4. Divide .76121	by 41.	10. Divide 1.	by 863.
5. Divide .612821	by 7.21	11. Divide .012181	by .12
6. Divide .121819	by .721	12. Divide .0001212	by .018

Of REDUCTION *of* DECIMALS.

CASE I.

Q. HOW *do you reduce a* Vulgar Fraction *to a* Decimal?

A. Divide the *upper Term* by the *lower.*

Note. 1. Both Terms *are to be esteemed* whole Numbers.

2. By this *Case, Tables* containing the Decimal Parts of any Integer are constructed.

EXAMPLES.

1. Reduce $\frac{5}{26}$ to a Decimal. *Facit* .1923076+.
2. Reduce $\frac{2}{28}$ to a Decimal. *Facit* .1785714+.

3. Reduce

3. Reduce $\frac{11}{14}$ of $\frac{10}{13}$ to a Decimal. *Facit* .6043956+.

4. Reduce 7*s.* 6*d.* to the Decimal of a Pound *Facit* .375*l.*

5. Reduce 10*s.* 9*d.* $\frac{1}{4}$, to the Decimal of a Pound. *Facit* .5385416+*l.*

6. Reduce 24 Grains to the Decimal of a *lb.* Troy. *Facit* .0041666+*lb.*

7. Reduce 14 Drams to the Decimal of a *lb.* Avoirdupois. *Facit* .0546875*lb.*

8. Reduce 4 *C.* 2 *qrs.* to the Decimal of a Tun *Facit* .225 *Tun.*

9. Reduce 14 *C.* to the Decimal of a Tun. *Facit* .7 *Tun.*

10. Reduce 174 Drams to the Decimal of an *C.* *Facit* .0060686+*C.*

11. Reduce 4 Inches to the Decimal of a Yard. *Facit* .1111111+*Yard.*

12. Reduce 76 Yards to the Decimal of a Mile. *Facit* .04318181+*Mile.*

13. Reduce 1 Mile to the Decimal of a League. *Facit* .33333333+*League.*

14. Reduce 3 *qrs.* 2 *na.* to the Decimal of a Yard. *Facit* .875 *yd.*

15. Reduce 4 Perches to the Decimal of an Acre. *Facit* .025 *Acre.*

16. Reduce 1 Pint to the Decimal of a Gallon. *Facit* .125 *galls.*

17 Reduce 1 Gallon of Wine to the Decimal of a *Hhd.* *Facit* .015873+*Hhd.*

18. Reduce 7 Minutes to the Decimal of a Day *Facit* .0048611+*Day.*

19. Reduce 2 Days to the Decimal of a Week. *Facit* .2857142+*Week.*

20. Reduce 72 Days to the Decimal of a Year. *Facit* .1972602+*Year.*

CASE 2.

Q. *How do you find the proper* Quantity *of a* Decimal Fraction *in the known Parts of an* Integer?

A. Multiply it by the common Parts of the *Integer.*

Q. *How do you prove* Questions *in this* Case?

A. By *Case* 1.

EXAMPLES.

1. What is the proper Quantity of .76 of a Pound? *Answ.* 15*s.* 2*d.* 1.6 *qr.*

2. What is the proper Quantity of .861 of a *C. wt?* *Answ.* 3 *qrs.* 12 *lb.* 6 *oz.* 14.592 *dr.*

3. What is the proper Quantity of .461 of a Shilling? *Answ.* 5*d.* 2.128 *qrs.*

4. What

4. What is the proper Quantity of .761 of a *hhd.* of Wine? *Answ.* 47 *galls.* 3 *qts.* 1.544 *pt.*

5. What is the proper Quantity of .17 of a Tun of Wine? *Answ.* 42 *galls.* 3.36 *qts.*

6. What is the proper Quantity of .761 of a Day? *Answ.* 18 *hrs.* 15 *min.* 53.4 *sec.*

7. What is the proper Quantity of .7 of a *lb.* of Silver? *Answ.* 8 *oz.* 8 *dwts.*

8. What is the proper Quantity of .71 of 4 *oz.* of Gold? *Answ.* 2 *oz.* 16 *dwts.* 19.2 *gr.*

9. What is the proper Quantity of .67 of a League? *Answ.* 2 *miles*, 0 *fur.* 3 *poles*, 1 *yard*, 0 *feet*, 3 *in.* 1.8 *bc.*

10. What is the proper Quantity of .712 of a Furlong? *Answ.* 28 *poles*, 2 *yards*, 1 *foot*, 11.04 *in.*

11. What is the proper Quantity of .07 of a Barrel of Ale? *Answ.* 2 *Gallons*, 1.92 *pt.*

12. What is the proper Quantity of .4712 of an Ell *English?* *Answ* 2 *qrs.* 1.424 *na.*

13. What is the proper Quantity of .72 of a *hhd.* of Beer? *Answ.* 38 *galls.* 3.52 *qts.*

14. What is the proper Quantity of .61 of a Tun of Wine? *Answ.* 2 *hhds.* 27 *galls.* 2 *qts.* 1.76 *pt.*

15. What is the proper Quantity of .092 of 3 Acres, 2 Roods? *Answ.* 1 *Rood*, 11.52 *Pole.*

16. What is the proper Quantity of .461 of a Chaldron of Coals? *Answ.* 17 *bush.* 2.384 *peck.*

17. What is the proper Quantity of .712 of 3 *qrs.* of Corn? *Answ.* 17 *bush.* 2 816 *qt.*

18. What is the proper Quantity of .3 of a Year? *Answ.* 109 *Days*, 12 *hrs.*

19. What is the proper Quantity of .5 of an Hour? *Ans.* 30 *m.*

20. A certain Tenant hired an house for 9 Years, at 12.4*l.* *per Annum;* how much was due at the End of the Term? *Answ* 111*l.* 12*s.*

Note 1. To this *Case* is refered *Case* 4, in *Practice*, p. 55.

EXAMPLES.

1286 *at* 4*s.*

1st. 4*s.* = .2*l.*

2d. 1286

2 *Facit* 257*l.* 4*s.*

257.2

20

4.0

2. *Addition* and *Subtraction* of *Decimals* of different Denominations, may easily be performed, after the *Decimals* are reduced to their *proper Quantities.*

EXAM-

EXAMPLES.

1. What is the Sum of 48*l.* and 16*s.* reduced to their proper Quantities? *Answ.* 9*s.* 9.12*d.*

2. What is the Sum of .17*lb.* Troy, and .84 *oz.* *Answ.* 2 *oz.* 17 *dwts.* 14.4 *gr.*

3. What is the Sum of .17 Tun, .19 *C.* .17 *qr.* and .7 *lb.*? *Answ.* 3 *C.* 2 *qr.* 15.54 *lb.*

4. What is the Difference between .17*l.* and .7*s.*? *Answ.* 2*s.* 8*d.* 1.6 *qr.*

5. What is the Difference between .41 Day and .16 Hour? *Answ.* 9 *hrs.* 40 *min.* 48 *sec.*

Of the SINGLE RULE *of* THREE DIRECT *in* DECIMALS.

Q. HOW *do you prove the following* Questions?
A. By changing their Order.

EXAMPLES.

1. If 1.4*lb.* of Mace cost 14.5*s.* what cost 75.31 *lb.*? *Answ.* 38*l.* 19*s.* 11*d.* 3.52 *qrs.*

2. If 1.6 *C.* of Sugar cost 3*l.* 12.76*s.* what cost 3 *hhds.* each 11 *C.* 3 *qrs.* 10.12 *lb.*? *Answ.* 80*l.* 15*s.* 3*d.* 3.36 *qrs.*

3. If 1.5 *oz.* of Silver be worth 7.8*s.* what is the Value of 9.7 *lb.*? *Answ.* 30*l.* 5*s.* 3*d.* 1 44 *qr.*

4. If 1.47 *C* of Sugar be worth 4.5*l.* what is 1.7 *lb.* worth at that Rate? *Answ.* 11.1*d.*

5 If 1 Pint of Wine cost 1.2*s.* what cost 12.5 *hhds.*? *Answ.* 378*l.*

6. If 8.4*lb.* of Tobacco cost 16*s.* 4.6*d.* what cost 3 *hhds.* each 4*C.* 2 *qrs.* 7.4 *lb.*? *Answ.* 149*l.* 12*s.* 3*d.* 2 *qrs.*

7. If 1 Yard of Cloth cost 12.3*s.* what cost 3 Pieces, each 21.5 Yards? *Answ.* 39*l.* 13*s.* 4 2*d.*

8. A Man bought a Piece of Cloth for 6*l.* 13.12*s.* I demand how many Yards there were in the same, when he gave after the Rate of 4*s.* 2.6*d.* per Yard? *Answ.* 31.569 *Yards.*

9. A Man bought 5.8 Tuns of Oil for 60.4*l.* but by Misfortune it chanced to leak out 50.9 Gallons; I demand how he must sell the rest *per* Gallon to be no Loser? *Answ.* 10.27*d. per Gallon.*

10. Two

10. Two Men bartered, *B* had 40.7 *yds.* of Linen, for which *C* gave him 25.6 Ells of Holland, at 4.5*s.* *per* Ell; I demand the Price of the Linen *per* Yard? *Answ.* 2*s.* 9*d.* 3.8 *qr.*

11. A Grocer bought 7.6 *C.* of Sugar, at 40.1*s.* *per C.* and sold the same out at 4.5*d.* *per lb.* I demand whether he gained or lost, and how much? *Answ.* 14*s* 5*d.* 1.12 *qr. gain.*

12. A Brewer made a Quantity of Beer, which cost him 90.4*l.* and afterwards sold it out at 26.7*s.* *per* Barrel, by which he gained 10*l.* I demand the Quantity that was brewed? *Answ.* 75 *Bar.* 7.4+ *Gall.*

13 A Grocer bought 3 *C.* 1.5 *qr.* of Cloves, at the Rate of 2.75*s.* *per lb.* and sold them for 60*l.* 11*s.* 6*d.* what did he gain or lose by the Bargain? *Answ. He gained* 8*l.* 12*s.*

14. A Merchant bought 436 Yards of Cloth for 8.5*s.* *per* Yard, and sold it again for 10.75*s.* *per* Yard; what did he gain by the Sale thereof? *Answ.* 49*l.* 1*s. gain.*

15. *A* owes *B* 296.85*l.* but he compounds for 7.5*s.* in the Pound; what must *B* receive for this Debt? *Answ.* 111*l.* 6*s.* 4*d.* 2 *qrs.*

16 Bought 3 *hhds.* of Tobacco, each weighing 4 *C.* 1.9 *qr.* at 5.6*l.* *per C.* which I sold out at 7*l.* 16*s.* *per C.* what did I gain by the Whole? *Answ.* 29*l.* 10*s.* 8*d.* 1.6 *qr.*

17. A Jeweller bought a Diamond for 60 Guineas; and after it was neatly cut, weighed 1.5 *oz.* which he sold again for 3.25*s.* *per* Grain; I demand how much he gained by the said Diamond; and also at what Rate *per Cent.* he made his Gain?

Answ.	*Whole Gain*	54*l.*	0*s.*	0*d.*	0 *qrs.*
	Gain per Cent.	85	14	3	1.7+.

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Of

Of CONVERGING SERIES:

OR,

Extracting the ROOTS *of all* POWERS.

A TABLE *of* POWERS.

Roots, - - - - - or First Powers	1	2	3	4	5	6	7	8	9
Squares, - - - - - or Second Powers	1	4	9	16	25	36	49	64	81
Cubes, - - - - - or Third Powers	1	8	27	64	125	216	343	512	729
Biquadrates, - - - or Fourth Powers	1	16	81	256	625	1296	2401	4096	6561
Surfolids, - - or Fifth Powers	1	32	243	1024	3125	7776	16807	32768	59049
Square Cubes, - or Sixth Powers	1	64	729	4096	15625	46656	117649	262144	531441
Second Surfolids, - - or Seventh Powers	1	128	2187	16384	78125	279936	823543	2097152	4782969
Biquadrates squared, - or Eighth Powers	1	256	6561	65536	390625	1679616	5764801	16777216	43046721
Cubes Cubed, - - - or Ninth Powers	1	512	19683	262144	1953125	10077696	40353607	134217728	387420489
Surfolids squared, - - or Tenth Powers	1	1024	59049	1048576	9765625	60466176	282475249	1073741824	3486784401
Third Surfolids, - - or Eleventh Powers	1	2048	177147	4194304	48828125	362797056	1977326743	8589934592	31381059609
Square Cubes squared, or Twelfth Powers	1	4096	531441	16777216	244140625	2176782336	13841287201	68719476736	282429536481
Fourth Surfolids, - - or Thirteenth Powers	1	8192	1594323	67108864	1220703125	13060694016	96889010407	549755813888	2541865828329
Second Surfolids squared, or Fourteenth Powers	1	16384	4782969	268435456	6103515625	78364164096	678223072849	4398046511104	22876792454961
Surfolids cubed, - - or Fifteenth Powers	1	32768	14348907	1073741824	30517578125	470184984576	4747561509943	35184372088832	205891132094649

Let this fold against Page 131.

Of the SQUARE-ROOT.

Q. WHAT *is a* Square?

A. Any Number multiplied by itself produces a *Square.*

Q. *What is the* Extraction *of the* Square Root?

A. If a *Square* be given to find one Side, it is called the *Extraction* of the *Square-Root.*

Q. *How is the given* Square *to be prepared for* Extraction?

A. By pointing off at every two Figures, from the *Units Place*, both Ways for a *Resolvend.*

Q. *What is a* Surd?

A. It is an imperfect *Square*, or such a Number, whose Square Root can never be exactly found.

EXAMPLES.

1. What is the Square of 17.1? *Answ.* 292.41.
2. What is the Square of .09 *Answ.* .0081.
3. What is the Square of .0094? *Answ.* .00008836
4. What is the Square-Root of 4712.81261? *Answ.* 68.649+.
5. What is the Square-Root of 9712.718051? *Answ.* 98.553+.
6. What is the Square-Root of 3.17218112? *Answ.* 1.78106+.
7. What is the Square-Root of 1.3976121? *Answ.* 1.1822+.
8. What is the Square-Root of 761.801216? *Answ.* 27.6007+.
9. What is the Square-Root of .0007612816? *Answ.* .02759+.
10. What is the Square-Root of 4.00006712? *Answ.* .2000016+.

11. There is an Army consisting of a certain Number of Men, who are placed Rank and File, that is, in the Form of a Square, each Side having 472 Men; I demand how many Men the whole Square contains? *Answ.* 222784 *Men.*

12. The Floor of a certain great Room is made exactly Square, each Side of which contains 75 Feet; I demand how many Square Feet are contained therein? *Answ.* 5625 *Feet.*

13. Suppose 12574 Soldiers are to be put into Rank and File, in the Form of an equal Square; I demand how many Soldiers will be in the Front, and how many deep? *Answ.* 112.

14. A certain Square Pavement contains 197136 Square Stones, all of the same Size; I demand how many are contained on one of its Sides? *Answ.* 444.

15. The

15. The Wall of a Town is 17 Feet high, which is surrounded by a Mote of 20 Feet in breadth? I demand the Length of a Ladder which shall reach from the Outside of the Mote to the Top of the Wall? *Answ.* 26.2+ *Feet.*

Of the SQUARE-ROOT *of a* VULGAR FRACTION.

Q. *How is the* Square-Root *of a* Vulgar Fraction *extracted?*

A. 1. Reduce the *Fraction* to its lowest Term.

2. Extract the *Square-Root* of the Numerator for a new *Numerator*, and the *Square-Root* of the Denominator for a new *Denominator.*

3. If the *Fraction* be a *Surd*, reduce it to a *Decimal*, and then extract the *Square-Root* from it.

4. The *Decimal Fraction* must consist of an even Number of Places, as *two, four,* &c.

EXAMPLES.

1. What is the Square-Root of $\frac{3044}{6849}$? *Answ.* $\frac{2}{3}$.
2. What is the Square-Root of $\frac{3456}{5400}$? *Answ.* $\frac{4}{5}$.
3. What is the Square-Root of $\frac{7056}{9216}$? *Answ.* $\frac{7}{8}$.

SURDS.

4. What is the Square-Root of $\frac{3168}{6192}$? *Answ.* .71528+
5. What is the Square-Root of $\frac{208}{273}$? *Answ.* .87447+
6. What is the Square-Root of $\frac{387}{738}$? *Answ.* .72414+

Of the SQUARE-ROOT *of a* MIXT NUMBER.

Q. *How is the* Square-Root *of a* mixt Number *extracted?*

A. 1. Reduce the *fractional* Part of a mixt Number to its lowest Term.

2. Reduce the *mixt Number* to an improper *Fraction.*

3. Extract the *Roots* of the Numerator and Denominator for a new *Numerator* and *Denominator.*

4. If the mixt Number given, be a *Surd*, reduce the *fractional Part* to a *Decimal*, and annex it to the whole Number, and extract the *Square-Root* from the Whole.

EXAMPLES.

1. What is the Square-Root of $37\frac{36}{39}$? *Answ.* $6\frac{1}{7}$.
2. What is the Square-Root of $17\frac{16}{25}$? *Answ.* $4\frac{1}{5}$.
3. What is the Square-Root of $5\frac{288}{648}$? *Answ.* $2\frac{1}{3}$.

SURDS.

4. What is the Square Root of $76\frac{14}{17}$? *Answ.* 8.7649+
5. What is the Square-Root of $7\frac{9}{11}$? *Answ.* 2.7961+

Of the CUBE-ROOT.

Q. WHAT *is a* Cube?

A. Any Number multiplied by its *Square* produces a *Cube.*

Q. *What is the Extraction of the* Cube-Root?

A. If a *Cube* be given to find out a Number, which being multiplied into its *Square*, produceth the Number given; this is called the Extraction of the *Cube-Root.*

Q. *How is the given* Cube *to be prepared for Extraction?*

A. By pointing off at every three Figures, both Ways, from the *Units Place*, for a *Resolvend.*

Q. *What is a* Surd?

A. It is an *imperfect Cube*, or such a Number, whose *Cube-Root* can never be exactly found.

Q. *What is the Rule for extracting the* Cube-Root *of a Number?*

A. This: The first Figure sought is the *Root* of the greatest *Cube* contained in the first Member, and it is called *a*; then $3aa+3a$ is the *Divisor*, which finds a new Figure called *e*; then $3aae+3eea+eee$ is the *Subtrahend*, or Number to be subducted; which *Operation* is to be continued to every *Resolvend.*

Note. This *Rule* being somewhat dark, I shall, by Way of Illustration, subjoin the *Operation* at large, for extracting the *Cube-Root* of any Number.

What is the Cube-Root of 444194·947?

(1) *Let the given* Number *be pointed as before directed;*

. . .

444194·947

(2) *The first* Member, *which contains the greatest* Cube *is* 444 *and the nearest* Root, *whose* Cube *is not greater than it, is* 7, *which set*

. . .

thus, 444194·947(7

(3) *The* Cube *of* 7 *is* 343, *which set down and subtract, annexing the next three Figures or Members, viz.* 194, *for a* Resolvend;

. . .

thus, 444194·947(7
343
———
101194 *Resolvend.*

(4) *The Number* 7 *in the* Root, *is called* a; *then by the* Rule, 3aa+3a *is the* Divisor; *thus,*

$$\begin{array}{rl} 7 = a & \\ 7 = a & \\ \hline 49 = aa & \\ 3 & \\ \hline 147 = 3aa & \\ 21 = 3a & \\ \hline \textit{Divisor}\ 1491 = 3aa+3a & \end{array} \qquad \begin{array}{l} \cdot\ \cdot\ \cdot \\ 444194.947(7 \\ \underline{343} \\ 1491)101194\ \textit{Resolvend} \end{array}$$

(5) *The next Figure in the* Root, *viz.* 6 *(found by common Division) is called* e; *then by the* Rule 3aae+3eea+eee, *is the* Subtrahend, *or Number to be subtracted; thus,*

$$\begin{array}{rl} 147 = 3aa & \\ 6 = e & \textit{eee}, \text{ viz. } 6 = 216 \\ \hline 882 = 3aae & \\ 756 = 3eea & \\ 216 = eee & \\ \hline \textit{Sub.}\ 95976 = 3aae+3eea+eee & \end{array} \qquad \begin{array}{r} 6 = e \\ 6 = e \\ \hline 36 = ee \\ 3 \\ \hline 108 = 3ee \\ 7 = a \\ \hline 756 = 3eea \end{array}$$

$$\begin{array}{l} \cdot\ \cdot\ \cdot \\ 444194.947(76. \\ \underline{343} \\ 1491)101194\ \textit{Resolvend} \\ \quad\ \ \underline{95976}\ \textit{Subtrahend} \\ \quad\ \ 5218.947\ \textit{Resolvend.} \end{array}$$

(6) *When the next* Member *is brought down,* viz. 947 *as before, both* Figures *in the* Root, *viz.* 76 *must be called* a; *then to find a Divisor to this last* Resolvend, *say as before* 3aa+3a; *thus,*

$$\begin{array}{rl} 76 = a & \\ 76 = a & \\ \hline 456 & \\ 532 & \\ \hline 5776 = aa & \\ 3 & \\ \hline 17328 = 3aa & \\ 228 = 3a & \\ \hline \textit{Divisor}\ 173508 = 3aa+3a & \end{array} \qquad \begin{array}{r} 76 = a \\ 3 \\ \hline 228 = 3a \end{array} \qquad \begin{array}{l} \cdot\ \cdot\ \cdot \\ 444194.947(76. \\ \underline{343} \\ 1491)101194\ \textit{Resolvend} \\ \quad\ \ \underline{95976}\ \textit{Subtrahend} \\ 173508)5218.947\ \textit{Resolvend} \end{array}$$

(7) *Th*

(7) *The next Figure in the* Root, *viz.* 3 *found as before, is also called* e; *then again* 3aae + 3eea + eee *is the other* Subtrahend, *or Number to be subducted; thus,*

17328 = 3*aa*
3 = *e* *eee*, viz. 3 = 27
51984 = 3*aae*
2052 = 3*eea*
27 = *eee*
Sub. 5218947 = 3*aae* + 3*eea* + *eee*

3 = *e*
3 = *e*
9 = *ee*
3
27 = 3*ee*
76 = *a*
162
189
2052 = 3*eea*

. . .

444194.947(76.3 *Answ.*
343
1491)101194 *Resolvend*
95976 *Subtrahend*
173508)5218 947 *Resolvend*
5218.947 *Subtrahend*
0

EXAMPLES.

1. What is the Cube of 6.4? *Answ.* 262.144
2. What is the Cube of .13? *Answ.* 002197
3. What is the Cube of 41.1? *Answ.* 69426.531
4. What is the Cube of .09? *Answ.* 000729
5. What is the Cube of .007? *Answ.* .000000343
6. What is the Cube-Root 7612.812161? *Answ.* 19.67+
7. What is the Cube-Root 7612181.7612? *Answ.* 196.71+
8. What is the Cube-Root 61218.00121? *Answ.* 39.41+
9. What is the Cube Root 7121.1021698? *Answ.* 19.238+
10. What is the Cube-Root 12000.812161? *Answ.* 22.89+
11. What is the Cube-Root .121861281? *Answ.* .425+
12. What is the Cube-Root .0069761218? *Answ.* .19107+

13. If a cubical Piece of Timber be 41 Inches long, 41 Inches broad, and 41 Inches deep: How many cubical Inches doth it contain? *Answ.* 68921 *cubical Inches.* 14. Suppose

14. Suppose a Cellar to be dug that shall be 12 Feet every way in length, breadth, and depth; how many solid Feet of Earth must be taken out to compleat the same? *Answ.* 1728.

15. Suppose a stone of a cubic Form to contain 47455^2 solid Inches; what is the superficial Content of one of its Sides? *Answ.* 6084 *Inches.*

Of the CUBE-ROOT *of a* VULGAR FRACTION.

Q. *How do you extract the* Cube-Root *of a* Vulgar Fraction?

A. 1. Reduce the *Fraction to its lowest Terms.*

2. Extract the *Cube-Roots* of the Numerator and Denominator for a new *Numerator* and *Denominator.*

3. If the *Fraction* be a *Surd,* reduce it to a *Decimal,* and then extract the *Cube-Root* from it.

4. The *Decimal Fraction* must consist of Ternaires of Places, as *three, six, nine, &c.*

EXAMPLES.

1. What is the Cube-Root of $\frac{359}{1188}$? *Answ.* $\frac{2}{3}$.
2. What is the Cube-Root of $\frac{1944}{4008}$? *Answ.* $\frac{3}{4}$.
3. What is the Cube-Root of $\frac{648}{3000}$? *Answ.* $\frac{3}{5}$.

SURDS.

4. What is the Cube-Root of $\frac{4}{9}$? *Answ.* .763+
5. What is the Cube-Root of $\frac{6}{7}$? *Answ.* .949+
6. What is the Cube-Root of $\frac{1}{3}$? *Answ.* .693+

Of the CUBE-ROOT *of a* MIXT NUMBER.

Q. *How do you extract the* Cube-Root *of a mixt* Number?

A. 1 Reduce the *fractional* Part to its lowest Terms.

2. Reduce the *mixt Number* to an improper *Fraction.*

3. Extract the *Cube-Roots* of the Numerator and Denominator, for a new *Numerator* and *Denominator.*

4. If the mixt Number given, be a *Surd,* reduce the *fractional Part* to a *Decimal,* and annex it to the whole Number, and extract the *Cube-Root* from the Whole.

EXAMPLES.

1. What is the Cube-Root of $578\frac{19}{27}$? *Answ.* $8\frac{1}{3}$.
2. What is the Cube-Root of $42\frac{21}{24}$? *Answ.* $3\frac{1}{2}$.
3. What is the Cube-Root of $5\frac{104}{125}$? *Answ.* $1\frac{4}{5}$.

SURDS.

4. What is the Cube-Root of $8\frac{2}{12}$? *Answ.* 2.013+
5. What is the Cube-Root of $7\frac{3}{5}$? *Answ.* 1.966+

Of the BIQUADRATE-ROOT.

Q. WHAT *is a* Biquadrate *Number?*

A. Any Number involved *four Times*, produces a *Biquadrate.*

Q. *How is the* Biquadrate-Root *extracted?*

A. First extract the *Square-Root* of the given *Resolvend*; and then extract the *Square-Root* of that *Square-Root*, for the *Biquadrate-Root* required

EXAMPLES.

1. What is the Biquadrate of 48? *Answ.* 5308416.
2. What is the Biquadrate of 96? *Answ.* 84934656.
3. What is the Biquadrate-Root of 5308416? *Answ.* 48.
4. What is the Biquadrate-Root of 84934656? *Answ.* 96.
5. What is the Biquadrate-Root of 21743271936? *Answ.* 384.

Of the SURSOLID-ROOT.

Q. WHAT *is a* Sursolid?

A. Any Number involved *five Times*, produces a *Sursolid.*

Q. *How is the* Sursolid-Root, *or the* Root *of any other higher* Power *extracted?*

A. By the following *general Rules.*

1. If any even *Power* be given, let the *Square-Root* of it be extracted, which reduces it to half of the given Power, then the *Square-Root* of that Power reduces it to half of the same Power; and so on till you come to a *Square* or a *Cube.*

For *Example:* Suppose a 24*th* Power be given; the *Square-Root* of that reduces it to a 12*th* Power; the *Square-Root* of the 12*th* Power reduces it to a 6*th* Power; and the *Square-Root* of the 6*th* Power to a *Cube.*

2. If any odd *Power* be given, as the 17*th*, &c. observe,

(1) From the *Unity Place*, both Ways, point off at every such number of Figures as in the *Index* of the Power for a *Resolvend.*

(2) Seek in the Table of *Powers* for such a Power (being the same Power with the *Index*) as comes nearest the first *Period*, whether greater or less, calling its *Root* accordingly *more than just*, or *less than just.*

(3) Annex so many *Ciphers* to the *Root*, as there are *Periods* in whole Numbers in the given *Resolvend.*

(4) Find the *Difference* between the given *Resolvend*, and the *Power* coming nearest the first *Period.*

(5) Whatever odd *Power* is given, the next lowest odd *Power* to that of the said *Root* must be found, with its annexed *Ciphers: i. e.* if the *9th Power* be given, find the *7th Power* of the *Root* and *Ciphers;* if the *11th Power* be given, find the *9th*, &c.

(6) Multiply that next lowest odd *Power* by the *Index* of the given *Power*, and let that Product be a *Divisor* to the *Difference* between the given *Resolvend* and *Power* first found, which depresses it to a *Square.*

(7) Point this *Square* into *Periods* of two Figures each.

(8) Then make the first *Root* without its *Ciphers* a *Divisor*, and ask how oft it may be found in the first *Period* of the *Square.*

(9) If the *Divisor* be *less than just*, you must multiply the *Quotient Figure* by half the *Index*, i. e. if the *Index* be 11, multiply the *Quotient Figure* by 5: If the *Index* be 9, multiply it by 4, &c. and add it to the *Divisor;* but if it be *more than just* you must subtract it from the *Divisor*, having a *Cipher* annexed or supposed to be annexed to the *Divisor:* Which *Sum* or *Difference* must be multiplied by the said *Quotient Figure*, and so continued to every new Figure in the *Quotient.*

(10) If the first *Root* with its *Ciphers* be *more than just*, the *Quotient* must be subtracted from it; but if it be *less than just* it must be added to it; and the *Sum* or *Difference* will be the *Root* required.

3. If an even *Power* be given, and the *Square-Root* of that *Power* being extracted, reduces it to an odd *Power*; you must then proceed with that odd *Power* as the foregoing *Rule* directs.

EXAMPLES.

1. What is the Surfolid of 6436343?

6436343
32 *the nearest* Surfolid, *whose* Root *and* Ciphers *is* 20.

3236343
The Cube *of* 20 *is* = 8000
And 8000 × 5 *is* = 40000
Then 40000)3236343(80 *Lastly* 20
Again 2 80(3 + 3
+ 3 × 2 = 6 78
1st Divisor = 26 — 23 *the Surfolid sought required.*
2 *to be rejected.*

Note. This is a very expeditious Way of extracting the *Roots* of *higher Powers*, but it is not always exact, because (as Mr. *Ward* observes, for it was taken from him) there will be a *Remainder*, and sometimes an *Excess* or *Defect* in the last *Figure* of the *Root* when the given *Resolvend* or *Power* hath no true *Root;* as appears by the *fifth Example* following, whose true *Root* should not be 384.3, as it there stands, but 384.

2. W

2. What is the Sursolid of 48? *Answ.* 254803968.
3. What is the Sursolid-Root of 8153726976? *Answ.* 96.
4. What is the Sursolid-Root of 254803968? *Answ.* 48.
5. What is the Sursolid-Root of 8349416423424? *Answ* 384.3

Of the SQUARE-CUBE-ROOT.

Q. WHAT *is a* Square-Cube?

A. Any Number involved *six Times*, produces a *Square-Cube.*

EXAMPLES.

1. What is the Square Cube of 48? *Answ.* 12230590464.
2. What is the Square-Cube-Root of 782757789696? *Answ.* 96.
3. What is the Square-Cube-Root of 12230590464? *Answ.* 48.
4. What is the Square-Cube-Root of 3206175906594816? *Answ.* 384.

Of the SECOND SURSOLID-ROOT.

Q. WHAT *is the* Second Sursolid?

A. Any Number involved *seven Times*, produces a *second Sursolid.*

EXAMPLES.

1. What is the second Sursolid of 96? *Answ.* 751447478108 16.
2. What is the Second Sursolid-Root of 751447478108 16? *Answ.* 96.
3. What is the Second Sursolid Root of 587068342272? *Answ.* 48.
4. What is the Second Sursolid-Root of 12311715481324093 44? *Answ.* 384.42

Of the SQUARE BIQUADRATE-ROOT.

Q. WHAT *is a* Square Biquadrate?

A. Any Number involved *eight Times*, is a *Biquadrate Squared* or *Square Biquadrate.*

EXAMPLES.

1. What is the Squared Biquadrate of 48? *Answ.* 28179280429056.

2. What is the Square Biquadrate-Root of 72138957898383 36? } *Answ.* 96.

3 What is the Square Biquadrate-Root of 281792804290 56? } *Answ.* 48.

4 What is the Square Biquadrate-Root of 4727698744828451880 96? } *Answ.* 384.

Of the CUBED CUBE-ROOT.

Q. WHAT *is a* Cubed Cube?

A. Any Number involved *nine Times*, is a *Cubed Cube.*

EXAMPLES.

1. What is the Cubed Cube Root of 69253399582448025 6? } *Answ.* 96.2

2. What is the Cubed Cube-Root of 13526054605946 88? } *Answ.* 48.09

3. What is the Cubed Cube-Root of 18154363180141255222 8864? } *Answ.* 384.5

Of the SQUARE SURSOLID-ROOT.

Q. WHAT *is a* Squared Sursolid?

A. Any Number involved *ten Times*, produces a *squared Sursolid.*

EXAMPLES.

1. What is the Squared Sursolid Root of 64925062108545024? } *Answ.* 48.

2. What is the Squared Sursolid-Root of 66483263599150104576? } *Answ.* 96.

3. What is the Squared Sursolid-Root of 69712754611742420055883776? } *Answ.* 384.3

Of the THIRD SURSOLID-ROOT.

Q. WHAT *is a* Third Sursolid?

A. Any Number involved *eleven Times*, produces a *third Sursolid.*

EXAMPLES.

1. What is the third Sursolid-Root of 952809757913927? } *Answ.* 23.

2. What is the third Sursolid-Root of 3116402981210161152? } *Answ.* 48.

3. What is the third Sursolid Root of 938239330551141003929 6? } *Answ.* 96.

Of the SQUARED SQUARE-CUBE-ROOT.

Q. WHAT *is* a Squared Square-Cube?

A. Any Number involved *twelve Times*, produces a *Squared Square-Cube.*

EXAMPLES.

1. What is the Root of this Squared Square-Cube 149587343098087735296? } *Answ.* 48.
2. What is the Root of this Squared Square-Cube 612709757329767363772416? } *Answ.* 96.
3. What is the Root of this Squared Square-Cube 102795639440290902917603980738 56? } *Answ.* 384.

A general Rule *for extracting the* ROOTS *of all* Powers.

1. PREPARE the given Number for *Extraction*, by pointing off from the *Unity Place*, as the *Root* required directs.
2. Find the first Figure in the *Root* by your own judgment, or by Inspection into the *Table* of *Powers.*
3. Subtract it from the *given Number.*
4. Augment the *Remainder* by the next Figure in the *given* Number, that is, by the first Figure in the next Point, and call this your *Dividend.*
5. Involve the *whole Root*, last found, into the next inferior *Power* to that which is given.
6. Multiply it by the *Index* of the *given Power*, and call this your *Divisor.*
7. Find a Quotient Figure by common Division, and annex it to the Root.
8. Involve all the *Roots*, thus found into the given *Power.*
9. Subtract this *Power* (always) from as many Points of the given *Power* as you have brought down, beginning at the lowest Place.
10. To the *Remainder* bring down the first Figure of the next Point for a new *Dividend.*
11. Find a new *Divisor* as before, and in like Manner proceed till the Work is ended.

EXAM-

EXAMPLES.

What is the Cube-Root of 115501303?

```
        115501303(487
         64
        ---
    48)515 Dividend
       ------
       110592 Subtrahend
    ----------
    6912)49093 Dividend.
    ----------
       115501303 Subtrahend
    ----------
                0
                -
  4 ×   4 ×   3 = 48 Divisor
 48 ×  48 ×  48 = 110592 Subtrahend
 48 ×  48 ×   3 = 6912 Divisor
487 × 487 × 487 = 115501303 Subtrahend
```

2. What is the Biquadrate-Root of 56249134561?

```
        56249134561)487
        256
        ---
    256)3064 Dividend
        -----
        5308416 Subtrahend
    442368)3164974 Dividend
           -------
           56249134561 Subtrahend.
           -----------
                     0
                     -
  4 ×   4 ×   4 ×   4 = 256 Divisor
 48 ×  48 ×  48 ×  48 = 5308416 Subtrahend
 48 ×  48 ×  48 ×   4 = 442368 Divisor
487 × 487 × 487 × 487 = 56249134561 Subtrahend
```

Note. This *General Rule* I received from my worthy Friend Mr. *William Mountaine*, F. R. S. and Teacher of the Mathematics at *Shad-Thames*

Of SIMPLE INTEREST.

Q. WHAT *particular* Letters *are used here?*

A. These; *P*, any *Principal.*
T, the *Time*,
R, the *Ratio* of the Rate *per Cent.*
A, the *Amount.*

Q. *What is the* Ratio?

A. It signifies only the *Simple Interest* of 1*l.* for one Year, at any proposed Rate of Interest *per Cent.* and is thus found;

l. *l.* *l.*
100 : 6 : : 1 : 0. 06
100 : 5 : : 1 : 0. 05, *&c.*

A TABLE *of* RATIOS.

Rate per Ct	*Ratio*	*Rate per Ct.*	*Ratio.*
2	02	6 ½	.065
3	.03	7	.07
3 ½	035	7 ½	075
4	.04	8	.08
4 ½	.045	8 ½	.085
5	.05	9	.09
5 ½	.055	9 ½	.095
6	.06	10	.1

CASE I.

Q. *When* P, T, *and* R, *are given to find* A; *how is it discovered?*

A. Thus; *ptr.* + *p* = *a.*

Note. Any Quantity of *Letters* put together like a Word, denote continual Multiplication.

EXAMPLES.

1. What Sum will 567*l.* 10*s.* amount to in 9 Years, at 6 *per Cent. per Ann.*? *Answ.* 873*l.* 19*s.*

2. What will 508*l.* 14*s.* amount to in 1 Year at 5 *per Cent. per Ann.*? *Answ.* 534*l.* 2*s.* 8*d.* 1.6 *qr.*

3. What will 600*l.* 14*s.* amount to in 10 Years, at 4 ½ *per Cent. per Ann.*? *Answ.* 871*l.* 0*s.* 3*d.* 2.4 *qrs.*

4. What will 4000*l.* amount to in 5 Years, at 3 ½ *per Cent. per Ann.*? *Answ.* 4700*l.*

Note. When the *Time* given does not consist of whole *Years*, then reduce the odd *Time* into Decimal Parts of a *Year*. And unless such Parts of a *Year* chance to be just ¼, ½, or ¾ of a *Year*, the best Way will be to reduce the odd *Times* into *Days*, and then work with the Decimal Parts of a *Year*, that are equivalent to those Days.

A TABLE

A TABLE *for the ready finishing the Decimal Parts of a* Year *equa to any Number of* Days *or* Quarters *of a* Year.

Days.	*Decimal Pts.*	*Days*	*Decimal Pts.*	*Days*	*Decimal Pts.*
1	.00274	10	.027397	100	.273973
2	.005479	20	.054794	200	.547945
3	.008219	30	.082192	300	.821918
4	.010959	40	.109589	365	1.000000
5	.013699	50	.136986		
6	.016438	60	.164383	$\frac{1}{4}$ *of a Year*	.25
7	.019178	70	.191781	$\frac{1}{2}$ *of a Year*	.5
8	.021912	80	.219178	$\frac{3}{4}$ *of a Year*	.75
9	.024657	90	.246575		

Note. When the true Number of *Days* cannot be found at one View i this *Table*, then both them and their *Decimals* must be taken out of t *Table* at *twice* or *thrice*, as their Number requires, and added togeth So the Decimal Parts of a *Year* = 236 *Days* are thus found.

200 = ·547945
30 = 082192
6 = 016438

236 = .646575

EXAMPLES.

5. What will 7200*l.* amount to in 6 $\frac{1}{2}$ Years, at 5 *per Cen per Ann.?* *Answ.* 9540*l.*

6. What will 1110*l.* 18*s.* amount to in 12 $\frac{3}{4}$ Years, at 5 *p Cent. per Ann.?* *Answ.* 1819*l.* 1*s.* 11*d.* 2.8 *qrs.*

7. What will 280*l.* 10*s.* amount to in 3 Years and 148 Day at 5 *per Cent. per Ann.?* *Answ.* 328*l.* 5*s.* 2*d.* 3 38. + *qrs.*

8. What will 196*l.* amount to in 189 Days at 4 *per Cent. p Ann.?* *Answ.* 200*l.* 1*s.* 2*d.* 1.23 + *qrs.*

CASE 2.

Q. *When* A, T, *and* R, *are given to find* P; *how is it discovered*

A. Thus; $\frac{a}{tr+1} = p$,

EXAMPLES.

1. I demand what Principal will amount to 873*l.* 19*s.* in Years, at 6 *per Cent. per Ann.* *Answ.* 567*l.* 10*s.*

2. I demand what Principal will amount to 534*l.* 2*s.* 8*d.* 1 *qr.* in 1 Year, at 5 *per Cent. per Ann.?* *Answ* 508*l.* 14*s.*

3. I demand what Principal will amount to 9540*l.* in 6 Years, at 5 *per Cent. per Ann.?* *Answ.* 7200*l.* 35

4. I demand what Principal will amount to 1819*l.* 1*s.* 1 2.8 *qrs.* in 12 $\frac{3}{4}$ Years, at 5 *per Cent. per Ann.?* *Answ.* 1110*l.* 1